NETWORK WORLD

The Newsweekly of User Networking Strategies

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Unisys set to unveil X.500 plans, tools

By Paul Desmond
Senior Editor

BLUE BELL, Pa. — Unisys Corp. is scheduled to announce this week X.500 Directory Services (DS) software for its Unix-based multiuser systems and plans to port the software to its mainframe and workstation operating systems.

The Unisys DS software will enable users to build centralized or distributed directories that make it easier to support a range of applications, such as file transfer and electronic mail, across nets of disparate Unisys computers.

Eventually, Unisys DS will allow users to link their X.500 directories to X.500 implementations on different vendors' equipment, letting users build a single distributed global directory for a variety of Open Systems Interconnection applications.

X.500 is an OSI standard for creating directories that contain the network addresses and full names of various network objects, including electronic mailboxes, computers, applications and files. It lets users key in simple names to message users or access files, instead of requiring the users to know the whereabouts and formal network name and ad-

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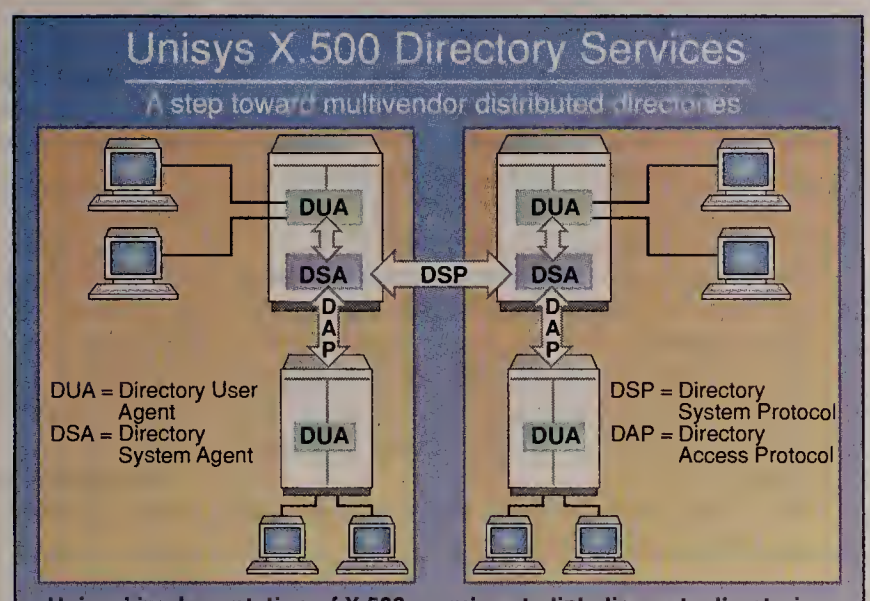

Unisys' implementation of X.500 promises to link disparate directories on various Unisys and non-Unisys computers. Directories can support such applications as E-mail, file transfer and net management.

GRAPHIC BY SUSAN J. CHAMPENY | SOURCE: UNISYS CORP., BLUE BELL, PA.

When is diverse network routing not really diverse?

When multiple carriers lease capacity on the same fiber or separate fibers in the same cable trench.

By Bob Wallace
Senior Editor

The recent rash of long-haul carrier fiber cuts — three in less than two days — has demonstrated the need for diverse routing in corporate networks and, more importantly, the need to ensure that facilities leased from multiple carriers actually follow different paths.

Carriers lease capacity on one another's networks, making it difficult for users to determine if their nets are fail-safe. One fiber or multiple fibers in the same trench, for instance, may represent a single point of failure for multiple carriers.

"A great number of users are under the mistaken impression that they have route diversity because they use more than one carrier for service between two points," said Henry Fiallo, group director of telecommunications and application systems for Ryder Systems, Inc. in Miami.

On May 16, for example, a New Jersey utility crew in a northern New Jersey rail yard cut a fi-

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DEC offers document mgmt. for DECnet

Plan would let users better manage compound documents consisting of text, images, graphics.

By Jim Brown
Senior Editor

BOSTON — Digital Equipment Corp. last week introduced its Document Management plan for helping DECnet users manage the creation, storage and retrieval of compound documents containing text, images and graphics.

The plan combines existing DEC products with client/server applications from four vendors, making it possible for users to store compound documents in data bases throughout a network and revise the documents as the data elements used to create them are changed.

Document Management is a step above traditional file management, in which data elements used to create compound documents are managed separately.

DEC offers EDI software, services. Page 4.

"Document management is a vital part of networking," said Craig Cline, associate editor of the "Seybold Report on Publishing Systems," an industry newsletter in Malibu, Calif. As companies store more documents electronically, they need tools to manage them, he said.

DEC said products conforming to its Document Management plan will be based on its Compound Document Architecture (CDA), a key component of which is its Digital Document Interchange Format (DDIF). CDA is modeled after Open Systems In-

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NW's User Panel speaks out on ISDN

By John Gallant
Editor

In an informal survey, members of *Network World's* User Advisory Panel discussed their views on Integrated Services Digital Network, as well as their plans for implementing the much-debated technology.

Panel members said ISDN will not play a key role in their network strategies in the immediate future and expressed concern about the slow deployment of ISDN services in the local loop.

In addition, members of the panel voiced concern about the cost of ISDN products and services, as well as incompatibilities among different vendors' ISDN equipment (see related story to left).

Network World's User Advisory Panel comprises top network executives from companies in a range of industries and representatives of leading users groups, including the Association

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NETLINE

NEWSPAPER

FEATURE

Top ISDN switches lack mutual compatibility

By Edwin Mier
Special to Network World

AT&T and Northern Telecom, Inc. are building their ISDN-compatible central office switches from widely differing sets of blueprints. The two switch makers dominate the embryonic U.S. Integrated Services Digital Network market, so the differences in their ISDN implementations deeply concern users who hope "plug and play" will be the hallmark of the brave new ISDN world.

Users should be aware of the following issues:

■ Of the several hundred features implemented in the ISDN software of both AT&T's and Northern Telecom's switches, fewer than 25% have been detailed in standardized implementation specifica-

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NetWare 386 3.1 to offer improved net performance

Latest release will improve reliability, support more net protocols and expand administration facilities.

By Susan Breidenbach
West Coast Bureau Chief

SAN JOSE, Calif. — Novell, Inc. last week filled in missing details about the next release of NetWare 386, Version 3.1, and said initial shipments to current NetWare 386 users would begin June 29, with general availability to follow in midsummer.

Enhancements that immediately benefit users include better server performance, increased hardware and software reliability, simplified loading of server-based applications, improved support of various LAN hardware and protocol options, and greatly expanded network administration and management facilities.

Greg Scott, computing services manager for Oregon State University's College of Business in Corvallis, which beta-tested both the initial 3.0 version and the 3.1 version of NetWare 386 in production environments, said the latter is "more flexible, faster and easier to install and administer."

However, Scott indicated that software developers are probably the main beneficiaries of this second release.

"Like an iceberg, much of what's exciting about this product resides below the surface," Scott

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Court bars Pennsylvania Bell from offering caller ID

Decision will have far-reaching effect on ANI plans.

By Anita Taff
Washington Bureau Chief

HARRISBURG, Pa. — An appeals court here last week barred Bell Telephone Co. of Pennsylvania from offering caller identification service in the state, ruling that the service violates Pennsylvania's wiretap law, as well as privacy provisions in the state's constitution.

Experts said the impact of the ruling could extend far beyond the state's boundaries by prompting other legal challenges to automatic number identification (ANI) and forcing regulatory officials to scrutinize proposed ANI services more closely.

The ruling could affect long-distance carriers' intrastate services that support ANI capabilities — including 800, 900 and Integrated Services Digital Network offerings — and present a problem for corporations that use ANI as a telemarketing tool.

"The implications could be quite far-reaching," said Eli Noam, former commissioner of the New York Public Service Commission. "I can't see a clear distinction between [capturing telephone numbers with] caller ID and with 800 or 900 services," he said.

The ANI issue has created a major rift in the industry. Carriers have touted the service as a

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Using ISDN to bridge LANs has its pluses, minuses

By Tom Smith
New Products Editor

Users that are trialing Integrated Services Digital Networks to bridge LANs say ISDN Basic Rate Interface (BRI) service offers several advantages over dial-up and leased lines.

Users say ISDN provides greater bandwidth than dial-up links and cost savings compared to leased lines because capacity can be bought when needed, rather than on a dedicated basis.

However, users acknowledge that BRI, which supports two 64K bit/sec channels and one 16K bit/sec signaling channel, is not suited for bandwidth-intensive local-area network applications such as imaging and large file transfers. Some also say that current BRI services lack net management functionality, although some vendors take issue with that assertion.

Banking on BRI

Ameritrust Co., N.A. is testing BRI to interconnect token-ring LANs that are equipped with Microcom, Inc. ISDN bridges, according to Tom Peters, vice-president of voice and data network planning at the Cleveland bank.

BRI provides a significant speed advantage compared to the dial-up lines and 2,400 bit/sec modems the company previously

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Briefs

AT&T, Retix forge OSI alliance. AT&T and Retix last week signed a technology agreement to integrate Retix's Open Systems Interconnection products into AT&T's Unix System V operating system software and to codevelop future products. The move would provide resellers of Unix System V with a consistent set of OSI applications and assure users that different vendors' Unix System V offerings support interoperable OSI applications.

The companies plan to integrate X.400 messaging services, X.500 directory services, File Transfer, Access and Management (FTAM), network management services and virtual terminal services with AT&T's OSI Communications Platform (CP-1).

CP-1 is AT&T's core implementation of the lower level OSI services, which will be integrated with Retix's OSI applications. CP-1 is closely tied to AT&T's Streams, an interprocess communications facility within Unix. The first products are due out in the first quarter of 1991 and will be offered as a separate option to Unix.

AT&T's Unix Software Operation and Retix will also build OSI applications for Unix System V.

In their own image. IBM and the University of Washington in Seattle last week said they will design a prototype medical imaging system that will provide physicians with access to X-rays and other diagnostic images stored across a network.

Initially, the imaging stations will be linked via Ethernet, but one of the three-year project's goals is to identify requirements for a higher speed network that can accommodate medical imaging files.

IBM will provide $4.5 million in hardware, software and staffing for the project, including IBM Personal System/2s, RISC System/6000s and the same imaging interface cards used in IBM's ImagePlus system.

Teleport builds Chicago bypass net. Teleport Communications-Chicago, Inc. last week announced it will construct a 15-mile fiber-optic network to serve Chicago's downtown business community.

The network, scheduled to be completed by the end of 1990, will support T-3, T-1 and 64K bit/sec private-line voice and data services. Teleport said customers can use the net to link company sites or access their long-distance carriers. Permission to build the network was granted in April.

Positioning statement. Minneapolis-based Northwest Airlines, Inc. last week said it will begin trialing a new satellite-based navigation system for airplanes next February. The test will utilize an emerging satellite technology that enables in-flight airplanes to accurately track their position by receiving radio transmissions from multiple satellites. Northwest Airlines will use a network of 24 satellites belonging to the Soviet Union and 24 belonging to the U.S. Air Force in the test, which will last a year.

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Times change. ACC's adaptive bridge/router now supports DECnet.

What's an adaptive bridge/router? It's a LAN communication platform you software-configure to serve as a bridge, as a router, or as both simultaneously.

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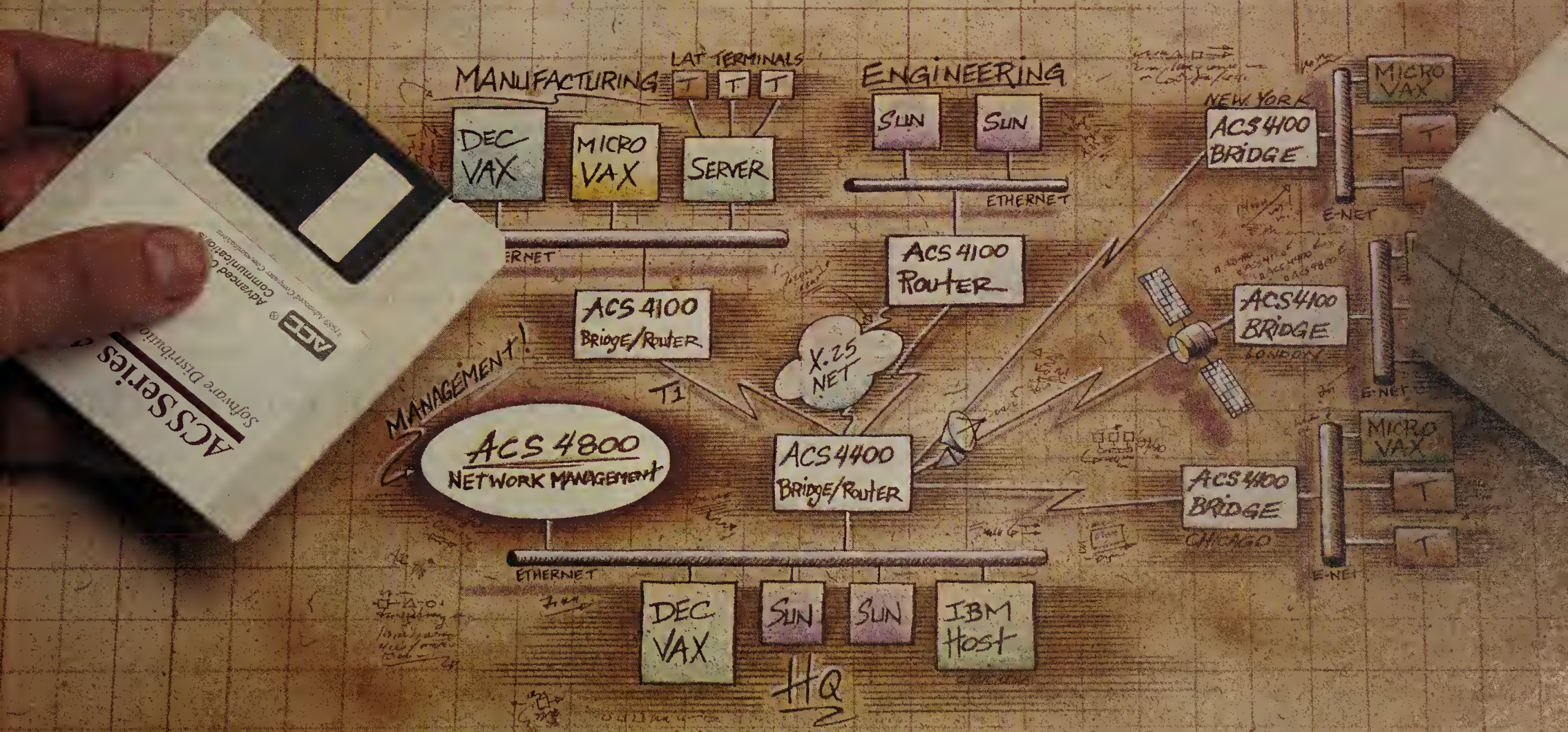

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Aggregators facing future clouded by new uncertainty

Long-haul firms rethink stance on aggregators.

By Bob Brown
Senior Editor

The fledgling call aggregation industry is facing a future made uncertain by long-haul carriers that have come to view aggregators as rivals.

Call aggregators and multisite long-distance buying groups have exploded onto the telecommunications scene in the past year. By combining the network traffic of multiple users, aggregators can give customers deep discounts on long-haul services that were once available only to the largest users ("Aggregator plans offer big savings," *NW*, April 16).

But long-haul carriers are taking steps to get back some of the aggregators' business. What's more, if AT&T is given greater regulatory freedom, as is expected, the carrier could move more aggressively to curtail the activities of aggregators, industry watchers said.

As a result, some users are growing wary of dealing with aggregators.

"I'd have some real concerns about going with an aggregator," said Phil Evans, director of telecommunications at FMC Corp. in Dallas. "What happens if AT&T pulls the plug on the aggregator? Could the aggregator fend for itself? What would happen to its customers?"

Bob Collett, president of International Telecom Group, a call aggregator in Cleveland, admits that users have good reason to be concerned about "market turbulence" and the fact that long-haul carriers are taking an adversarial stance toward aggregators.

However, according to Kirby Young, executive vice-president at ACOMM, Inc., a Minneapolis-based aggregator, "Aggregators that have experience and provide consulting and other services on top of discounts will survive."

Consolidation will likely strengthen the aggregation industry "by weeding out aggregators that don't belong," Young added.

Initially, aggregators were looked upon favorably by AT&T, which saw them as a way to expand its presence in the mid-range and low end of the long-distance market. MCI Communications Corp. even complained to the Federal Communications Commission last fall that AT&T was working hand in hand with aggregators to win back users that had migrated to MCI and US Sprint Communications Co.

But AT&T has grown cool toward aggregators.

"The biggest reason AT&T has soured on aggregators is that these companies are competing to sell the same products that AT&T is paying its salespeople to promote," said Daniel Briere, president of TeleChoice, Inc., a Manchester, Conn.-based tele-

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Justice charges Nynex with Consent Decree violations

Department cites actions of Telco Research unit in criminal charge for breach of Consent Decree ban.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The U.S. Department of Justice last week filed a criminal indictment against Nynex Corp. for "willfully disobeying" business restrictions of the 1982 Consent Decree.

The indictment stemmed from a two-year grand jury investigation into the activities of a Nynex subsidiary, Telco Research Corp., a telecommunications software firm in Nashville. The indictment charges that Telco Research continued to offer information services after it was acquired by Nynex in April 1986. The regional Bell holding companies are barred from providing information services under the decree.

This is the first criminal charge filed against an RBHC for violating the Consent Decree.

Several times in the past, the Justice Department has filed civil contempt charges against the RBHCs for violations of the Consent Decree in instances where the department found no willful violation of the decree. Civil contempt charges do not involve any monetary penalties.

Observers said the criminal indictment of Nynex could stall or kill efforts under way to give the RBHCs greater freedom.

Brian Moir, counsel for the International Communications Association, said the indictment may cause legislators and regulators to reconsider granting the carriers any additional freedoms.

"It reemphasizes what we've known for years," Moir said. "There's a natural incentive on the part of the [RBHCs] to abuse their monopoly position, and that situation will be exacerbated if we move into a period of lessened enforcement."

Nynex must appear by June 14 in the U.S. District Court for the District of Columbia, where the case was filed, to enter a plea on the indictment. The trial will be conducted by U.S. District Court Judge Harold Greene, who oversees the Consent Decree. If Nynex is found guilty, the company will be subject to fines, which will be set by Greene. No maximum amount is specified for the fine.

The specific violation singled out in the Nynex indictment involved a contract under which Telco Research allowed MCI Communications Corp. to access, store and process information in a net design data base on Telco Research computers.

MCI was not named as a party in the case, and an MCI spokeswoman said the long-distance carrier contracted for service with Telco Research before it was purchased by Nynex. The contract was later terminated, she said.

In a statement released last week, James Rill, assistant attorney general for the antitrust division of the Department of Justice, said Nynex's "willful violation of the Consent Decree is a very serious matter, deserving of criminal penalties. A court order is the law, and companies are not free to deliberately or recklessly disregard that decree."

Nynex officials denied the charge. "The allegation is without merit and without basis in law and fact," the company said in a prepared statement.

"We are confident that a trial of this case will confirm to our customers, our shareholders and the general public that Nynex has fully met its responsibilities with regard to the [Consent Decree]," the statement said.

Telltale letter

However, in a February 1987 letter to the Justice Department, Gerald Murray, general solicitor of Nynex, admitted that some of Telco Research's activities violated the Consent Decree.

Specifically, Murray said Nynex failed to discontinue a tariff data base service run by Telco Research, engaged in consulting services beyond those allowed by the decree, allowed MCI to access network design software running on Telco Research computers and failed to comply with provisions requiring education of managers about the decree.

Murray told Nancy Garrison, then assistant chief of the communications and finance section of the antitrust division, that several of the apparent violations occurred due to misunderstandings or a lack of information on the part of Telco Research's management after the acquisition.

Murray's letter did not become public until February 1989, because Nynex said it contained

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DEC offers EDI software, user consulting services

Firm delivers on promises with DEC/EDI package.

By Jim Brown
Senior Editor

BOSTON — Digital Equipment Corp. last week introduced its first electronic data interchange software and said it will team with Price Waterhouse and Coopers & Lybrand to offer EDI consulting services to users.

The new software, dubbed DEC/EDI, runs on DEC VAXes and will enable users to electronically exchange such business documents as purchase orders and invoices with trading partners. The software supports exchange of EDI documents using CCITT's X.400 or IBM's 2780 or 3780 Binary Synchronous Communications protocols.

Also last week, nine application vendors pledged to integrate their business applications with DEC/EDI. AT&T, BT Tymnet, Inc., GE Information Services and MCI Communications Corp. also certified that DEC/EDI will work with their EDI network services.

DEC said DEC/EDI conforms to its Network Application Support program, a blueprint for interoperable DECnet-based applications, and said it has been pilot-testing the EDI software in 30 of its manufacturing plants since last year.

The software supports many EDI standards, including the United Nations' EDI for Administration, Commerce and Transport (EDIFACT), ANSI X12 and an EDI transaction set defined by the Transportation Data Coordinating Committee.

DEC first laid out its EDI strategy last November when it introduced its All-In-1 Phase II office automation software.

"DEC has it now — finally," said Torrey Byles, consultant with Input, a Mountain View, Calif.-based consulting firm. DEC, he said, has been talking about providing EDI software for nearly two years and enters the market trailing such EDI competitors as IBM and Sterling Software, Inc.

DEC/EDI enables users to produce EDI documents using information generated by existing business applications, such as inventory control and order processing systems. Data from the applications is used to build standard EDI documents that are transmitted to business partners.

The software consists of three modules: DEC/EDI Application Server, DEC/EDI Translation Server and DEC/EDI Communications Server. Each of these modules can run on a single VAX or on separate VAXes in a network.

Most other EDI software vendors require their entire package to run on one system, analysts said.

DEC/EDI Application Server includes a set of developer's tools, including application program interfaces, needed to link existing applications to DEC/EDI Translation Server software.

In essence, DEC/EDI Application Server makes current applications running on workstations or other computers in the net act as clients to DEC/EDI Translation Server. DEC/EDI Translation Server software translates data from an internal application into one of many EDI standard formats.

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NW Bulletin Board debuts

In an effort to facilitate communications with *Network World* readers — a dialogue critical to our efforts to serve you as best we can — we have installed an electronic bulletin board.

The *Network World* Bulletin Board will enable you submit letters to the editor, leave messages for *Network World* writers, submit story tips, change the mailing address for your *Network World* subscription and interact with other *Network World* readers.

We also plan to add a shareware area, where you will be able to find free programs of interest and utilities to help you use your MS-DOS computer more efficiently.

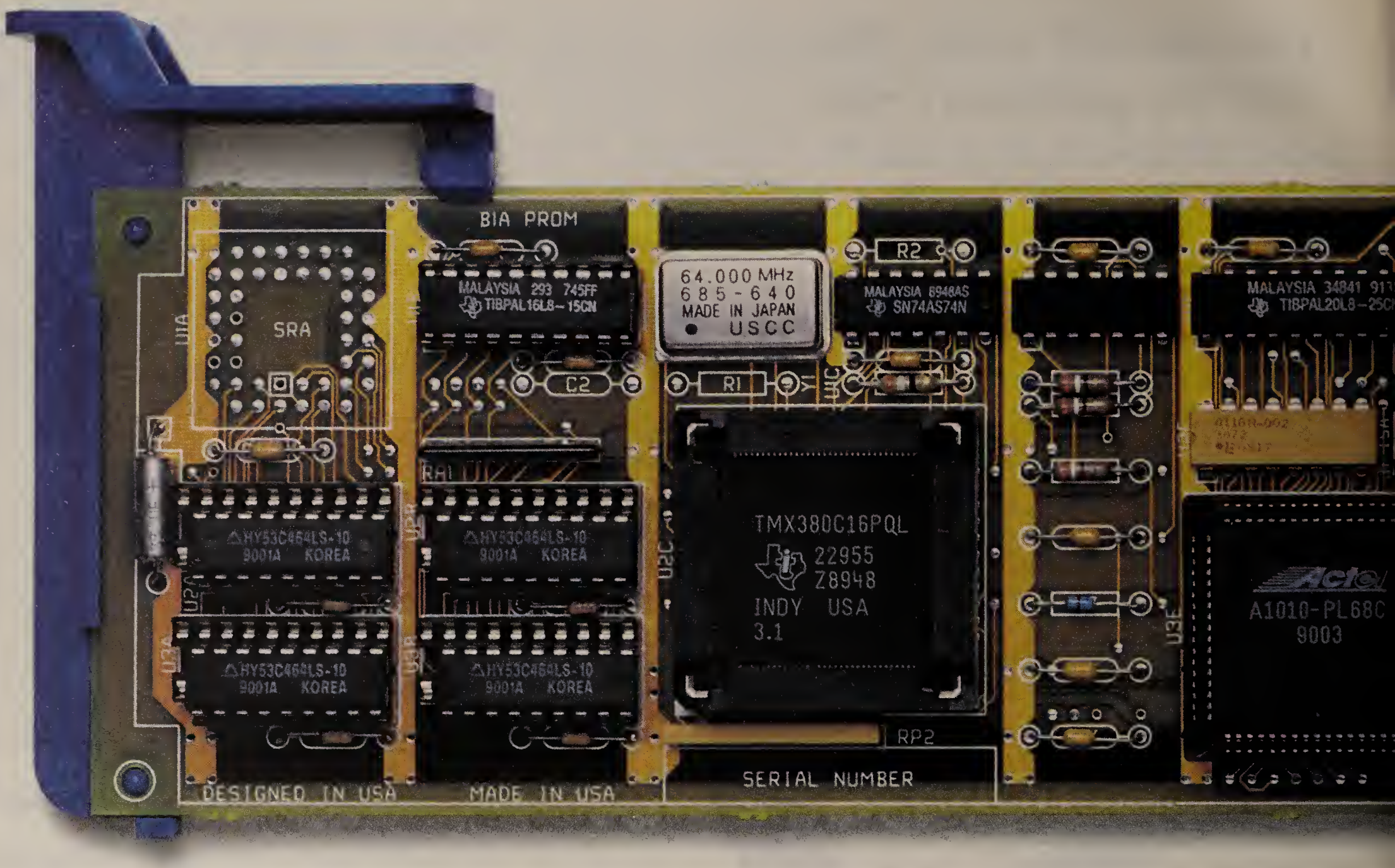
The board can be accessed at 300 to 2,400 bit/sec by dialing (508) 620-1160, or at 300 to 9.6K bit/sec (V.32) by dialing (508) 620-1178. Both modems support eight data bits, no parity and one stop bit.

The first time you log on, you will be asked to complete a user registration form. On subsequent occasions, you will be presented with the board's main menu.

One of the options on the main menu is the Open Forum, a place where readers can pose questions to other readers or pass on advice. We hope it proves to be a useful tool in sharing ideas, experiences and knowledge with your peers.

Please address to John Gallant, editor, or John Dix, executive editor, any comments or suggestions about how to make the bulletin board more useful.

Sometimes you just need
a flexible board.



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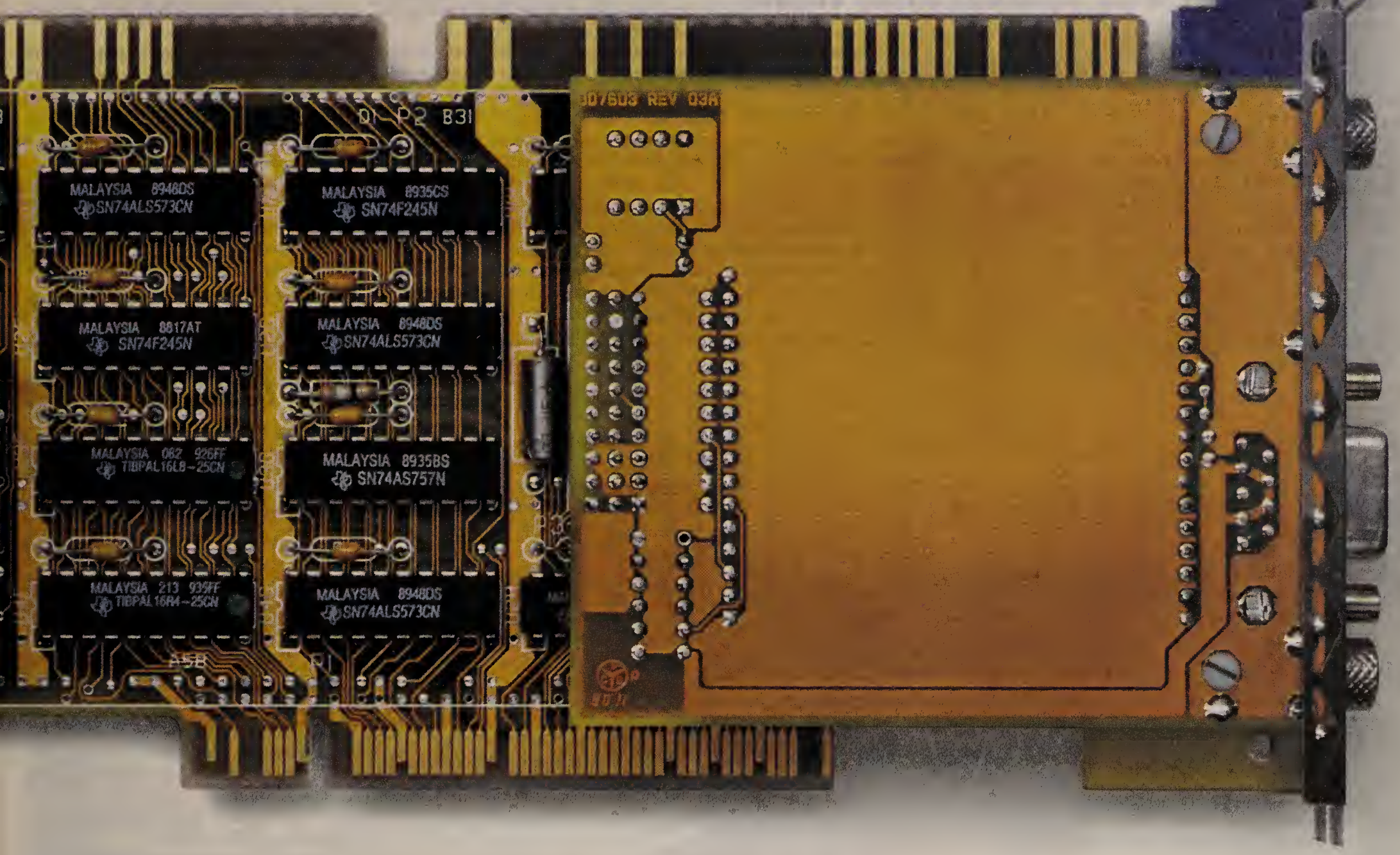

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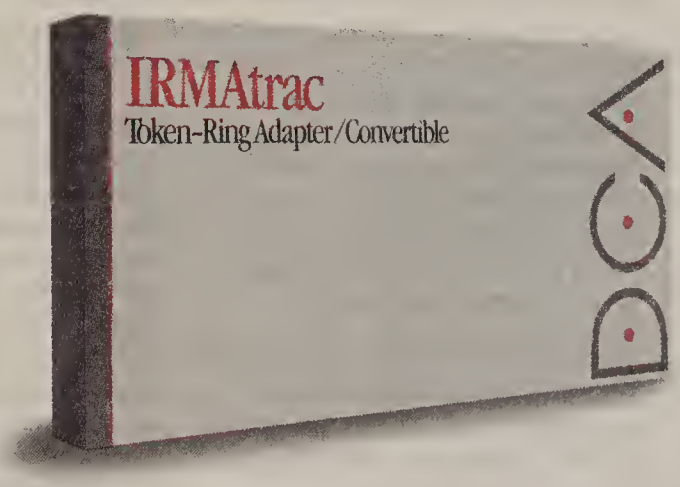

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See The FAXNet Form on Page #68

DCA announces Windows-based software for PC, mainframe links

By Laura DiDio
Senior Editor

BOSTON — Digital Communications Associates, Inc. (DCA) last week unveiled Irma WorkStation for Windows, software that lets personal computer users establish asynchronous and synchronous links with personal computers and IBM mainframes.

The software, which runs on DOS-based personal computers, enables users to set up a personal computer-to-personal computer or microcomputer-to-mainframe session by using Microsoft Corp.'s Windows 3.0 graphical user interface.

Irma WorkStation for Windows is a comprehensive package that bundles an array of physical media connection and terminal-emulation choices that DCA previously sold separately.

"It would have taken four to six DCA software packages plus an Irma board to duplicate all of the features and functionality we've incorporated into Irma WorkStation for Windows," said Steven Kengus, DCA's senior product manager for PC Communications products.

With Irma WorkStation for Windows, DCA is also for the first time offering DOS users the ability to support multiple IBM Advanced Program-to-Program Communications sessions with an IBM host from a single workstation.

Irma WorkStation for Windows resides on MS-DOS-based personal computers and runs in tandem with Windows 3.0, providing users with a graphical user interface similar to the one contained in the OS/2-based Presentation Manager, Kengus said.

The software supports direct microcomputer-to-mainframe connections over coaxial cable in both Control Unit Terminal and Distributed Function Terminal modes. It also gives users the option of establishing sessions over token-ring nets or Synchronous Data Link Control lines for wide-area connections.

Irma WorkStation for Windows offers users significant enhancements over DCA's current 3270 terminal-emulation package called WindowLink for Irma, Kengus said.

The software can, for example, allow users to establish as many as five concurrent 3270 terminal-emulation sessions with a host. It can also emulate ASCII terminals, such as Digital Equipment Corp.'s VT-100, -220 and -320 and IBM's 3101.

By contrast, Kengus said, the older WindowLink for Irma application software package only provided users with single-session connectivity to the mainframe over coaxial cable and did not support sessions over phone lines.

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SW Bell signs up AT&T as user of self-healing net

By Ellen Messmer
Washington Correspondent

HOUSTON — Southwestern Bell Telephone Co. last week announced it has begun installation here of a Self-healing Transport Network (STN) that is being built to the specification of the service's first customer, AT&T.

Southwestern Bell said that, on a commitment from AT&T to use STN, it is upgrading 17 of its 45 central office switches here to support the fiber-optic-based, fault-tolerant T-3 service.

Although the service will be available to other users, US Sprint Communications Co. denounced the offering because of the pricing scheme. Southwestern Bell is offering the service on a customer-specific basis rather than through general rates.

STN is similar to the self-healing network service US West, Inc. announced three weeks ago. Like the US West service, STN will be based on dual counterrotating fiber-optic rings. If a fiber segment or node goes down, the net can heal itself by routing around the afflicted area, restoring communications within 2½ seconds. Southwestern Bell said it hopes to attain a restoration time of 50 milliseconds.

Unlike US West, which plans to file a general tariff for its service at the Federal Communications Commission this week, Southwestern Bell has filed a customer-specific tariff for STN, naming AT&T as the customer.

The tariff is called STN-Option I, and its service duration is five years. Gene Bandel, account manager for Southwestern Bell, said the company wants other customers to use STN but will work out agreements with other users separately and file FCC tariffs on a customer-specific basis.

US Sprint said Southwestern Bell's pricing approach is virtually a mirror image of AT&T's Tariff 12 filings and, consequently, opposes it for the same reasons.

Bandel acknowledged that Southwestern Bell was taking a Tariff 12 approach to the service but said the company is confident the plan will win FCC approval.

The plan, however, flies in the face of a December FCC ruling ordering the local exchange carriers to file generalized T-3 rates. Bandel conceded that asking the commission to approve customer-specific

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Worth Noting

"One recent report suggested we are falling seriously behind European and Asian nations in modernizing our telecommunications infrastructure. However, to paraphrase Mark Twain, 'Reports of our death are greatly exaggerated.' "

William Esrey
Chairman, president and chief executive officer
United Telecommunications, Inc.
in a speech at the International Communications Association's 43rd Annual Conference and Exhibition
New Orleans

People & Positions

Infonet Services Corp., the international value-added network services company, recently appointed **Rudi Roth** to the newly created position of director of Enterprise-Defined Network Services at its European headquarters in Brussels, Belgium.

Roth will be responsible for developing marketing programs to promote private and hybrid communications net offerings that Infonet designs, installs, manages and maintains for international users.

Previously, Roth was operations manager for the Reinsurance and Insurance Network cooperative in Belgium.

Vincent Deschamps has been named to the newly created position of sales director for **VMX, Inc.'s** VMXworks hardware and software application platform product.

Deschamps will be responsible for developing sales strategy, commercial business relationships, sales tools and resources for VMXworks. He will report to Ray Glynn, VMX executive vice-president.

Previously, Deschamps was vice-president of sales and marketing for Microvoice Corp.

COS lets Bull test its own wares for OSI conformance

Critics say move may affect impartiality of tests.

By Ellen Messmer
Washington Correspondent

MCLEAN, Va. — The Corporation for Open Systems International (COS) recently sanctioned Bull HN Information Systems, Inc. to test its products for conformance to the Open Systems Interconnection protocols specified under the COS Mark program.

Critics denounced the move, contending that putting conformance test authority into the hands of an equipment vendor is paramount to "tainting the results."

Under the agreement, Bull was named a First Party Test Center and is now accredited to perform OSI tests on its products to ensure compatibility with the Transport Protocol, Internet Protocol and Message Handling System described under the OSI protocol suite. Bull is the first vendor ever permitted to test products under the COS Mark Program.

Based on Bull's own testing, COS will award its COS Mark seal of approval to the vendor for the products that meet the OSI specifications.

Frank Dzubeck, president of Washington, D.C.-based Communications Network Architects, Inc., criticized the move to allow vendors to conduct conformance testing. "You should always have an impartial judge," he said. "This is what is known as low-budget testing. It's outsourcing of testing."

COS has struggled with financial problems during the past year, and the organization has stated that outsourcing will be one of the ways that it will try to hold down costs while pursuing the goal of promoting OSI internationally. When COS initially announced the COS Mark Program, it indicated that testing would be handled by independent parties.

Dzubeck said the problem was not blatant dishonesty, but the difficulty in ensuring that all labs are performing the latest tests as time progresses. He said users will likely go along with vendor testing until a product isn't conformant.

"I've never seen a scheme like this work in the long run," Dzubeck said. He suggested that a wiser course for COS would have been to certify a select group of independent labs.

(continued on page 10)

INDUSTRY BRIEFS

Southwestern Bell Corp. and **OTC, Ltd.,** the Australian government-owned telecommunications firm, last week said they have formed a consortium to bid for a portion of **Telecom Corp.,** New Zealand's state-owned telephone company.

New Zealand's government is selling the telephone company as part of a program to pay off debts. But New Zealand's Commerce Commission has yet to give initial clearance to OTC to make a bid.

Executives from OTC, which has a monopoly on Australia's international telecommunications, said they have had talks with some New Zealand companies about expanding the consortium.

Infonet Services Corp., an international value-added network provider, and **Consumers Software, Inc.** last week announced that they will interconnect their electronic mail offerings. Under the agreement, Infonet will interconnect its worldwide Notice 400 messaging service with Consumers Software's Network Courier 400 package. Infonet's Notice 400 service is accessible in more than 100 countries for E-mail, facsimile and telex transmissions. The agreement with Consumers Software will enable more than 600,000 Network Courier users worldwide to interconnect with Notice 400.

Stratus Computer, Inc. recently announced three marketing agreements that will enable it to resell to banks versions of existing electronic data interchange, lockbox and security software that run on its XA2000 fault-tolerant minicomputers.

Stratus said it will resell a version of New York-based **National Systems Corp.'s** Connexion software for XA2000s

(continued on page 10)

T-1 multiplexer vendors pursue LAN traffic

Multiplexer vendor	LAN/WAN vendor alliance	Interconnection strategy
AT&T	cisco Systems, Inc.	Multiprotocol router (cisco), bridges (internal, Hewlett-Packard Co.)
Infotron Systems Corp.	None	Routing bridge
Network Equipment Technologies, Inc.	cisco Systems	Multiprotocol router
Newbridge Networks, Inc.	Wellfleet Communications, Inc.	Multiprotocol router
Racal-Milgo	None	Routing bridge
StrataCom, Inc.	Vitalink Communications Corp., Digital Equipment Corp., cisco Systems	Open-ended bridge and router
Timeplex, Inc.	RAD Network Devices	Routing bridge (RAD), FDDI and bridge card (internal)

GRAPHIC BY SUSAN SLATER — SOURCE: THE YANKEE GROUP, BOSTON

T-1 mux firms push high-bandwidth role

Multiplexer makers look to increase demand by offering support for bandwidth-intensive data.

By Bob Brown
Senior Editor

T-1 multiplexer makers are moving to bolster demand for their products by making it attractive for users to transmit data from bandwidth-intensive applications across private backbones.

Equipment vendors are moving quickly to line up support on their multiplexers for bandwidth-intensive data in an effort to spur demand, which has slacked off as many private network users jump to virtual private nets offered by carriers.

Users can expect T-1 multiplexer vendors to offer enhanced local-area network connectivity on their multiplexers that would facilitate the transmission of LAN, imaging and video traffic — all of which consume large amounts of bandwidth — over T-1 and T-3 backbones.

"The pure economic driver of T-1 and T-3 for end users has certainly slowed down," said Berge Ayvazian, a vice-president at The Yankee Group, a Boston consultancy. Instead of just selling multiplexers on the basis of cost savings, vendors are touting the capability of T-1 and T-3 gear to support transmission of bandwidth-intensive applications.

Timeplex, Inc., for example, is trying to persuade users to flood their T-1 backbones with LAN traffic by offering users 100M bit/sec Fiber Distributed Data Interface products that can be used to connect LANs to a high-speed backbone attached to wide-area links.

Market leader Network Equipment Technologies, Inc. (NET) is pitching small "feeder muxes" to pump up the amount of data running across the private backbone. Feeder muxes route traffic from small sites onto the backbone.

Furthermore, NET has established a joint development agreement with internetwork equipment maker cisco Systems, Inc. that will enable NET's multiplexers to become more tightly integrated with cisco Systems' multiprotocol routers. This would facilitate connection of LANs to NET multiplexers.

Infotron Systems Corp. is encouraging users to send a variety of data types across their backbone nets by offering an integrated network management system designed to let users centrally monitor and control traffic running across their LANs and WANs.

"The pure economic driver of T-1 and T-3 for end users has slowed down."

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"We're all pointing out to customers that the best way to get the lowest cost per application is to aggregate as much traffic as possible onto the backbone network," said Mike Ripple, Infotron's manager of network applications and planning.

The Yankee Group predicts that the market for high-speed private-line equipment, such as T-3 multiplexers, is "on the verge of an explosion." According to a

(continued on page 10)

T-1 mux firms push high-bandwidth role

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report, titled "The Market for High-Speed Network Equipment," issued by the consultancy last month, the market will grow from about $18.3 million this year to $260 million by 1995.

Initial growth will come from users seeking cost savings and those driven by new applications, namely LAN-to-WAN, video and imaging, said The Yankee Group's Ayvazian. Growth in the mid-1990s will be driven by the carriers, which will buy the high-speed networking equipment to support their increasing array of high-speed network services, he explained.

Many T-1 equipment vendors have formed product development alliances with internetwork vendors that market bridges, routers and gateways. In addition, some multiplexer makers have initiated internal development of their own internetwork products to attract users that want to send LAN traffic over WAN backbones (see graphic, page 9).

StrataCom, Inc. is among the leaders in this area, having established agreements with Vitalink Communications Corp. and cisco Systems. Timeplex has hooked up with internetwork supplier RAD Network Devices, NET with cisco Systems, Newbridge Networks, Inc. with Wellfleet Communications, Inc., and AT&T with cisco Systems to encourage users to send LAN traffic over their private backbones.

"The key here is that users of high-powered workstations and PCs have expectations about the reponse time of LANs and have had high bandwidth available locally," Ayvazian said. "The extent to which they can obtain the same response time over the wide-area network will be important to them."

Ayvazian said he expects to see these same T-1 equipment vendors team up with image-processing and videoconferencing equipment vendors to encourage users to send image and video traffic over their backbone nets.

"They shouldn't sit back and wait for these markets to develop," Ayvazian said. "They should be providing the infrastructure to facilitate [image and video networking]."

See The FAXNet Form on Page #68

Industry Briefs

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starting this December. With the software, banks will be able to offer corporate clients XA2000-based EDI services that conform to EDI standards developed by ANSI, the Transportation Data Coordinating Committee, the National Automated Clearing House Association and the Bank Administration Institute.

The software enables banks to receive EDI messages from clients that instruct banks to use electronic funds transfer to pay bills. Pricing for the Stratus version of Connexion starts at $65,000.

Stratus will also resell New York-based **Rigakos Software Development Corp.'s** LBX-2000 lockbox application software that enables banks to support a lockbox operation on an XA2000. The Stratus version is available now. Pricing starts at $85,000. Lastly, Stratus will resell Silver Spring, Md.-based **Comtek Services, Inc.'s** GuardNet 2000. GuardNet 2000 uses ANSI's X9.23 data encryption standard to encrypt financial data transmitted from the XA2000 to remote terminals. The Stratus version of GuardNet will be available in September for $50,000.

COS lets Bull test for OSI conformance

continued from page 9

Dave Grieve, a member of the COS technical staff, said that extensive review of lab procedures and staff is required to receive accreditation. He noted that other vendors — Hewlett-Packard Co. and Control Data Corp. — will also be named First Party Test Centers within the next month.

Daryll Wartluff, vice-president of user environment products for Bull, as well as a member of the COS board of directors, dismissed Dzubeck's concerns as unwarranted.

> "When we go out to the lab, we look at how they follow the process," Grieve said. "We have the right to do audits."
>
> ▲▲▲

Vendor testing is a reasonable approach, Wartluff said. "That should not be an issue. It should be an expedient way to get these products to market," he said, adding that Bull would have a number of new products on the market this year with the COS Mark.

Grieve defended the process for COS, saying that part of the job in the COS Mark Program is "to keep the test centers up-to-date on what's going on in the COS Mark Program. The testing is evolving."

Grieve pointed out that under the conditions for accreditation, the vendor must keep COS informed about staff and organizational changes. Vendors must put their procedures and policies in a manual. "When we go out to the lab, we look at how they follow that process," Grieve said. "We have the right to do audits if need be."

In the future, COS will not only be accrediting more vendor labs for COS Mark testing, but user centers and independent commercial testing labs as well.

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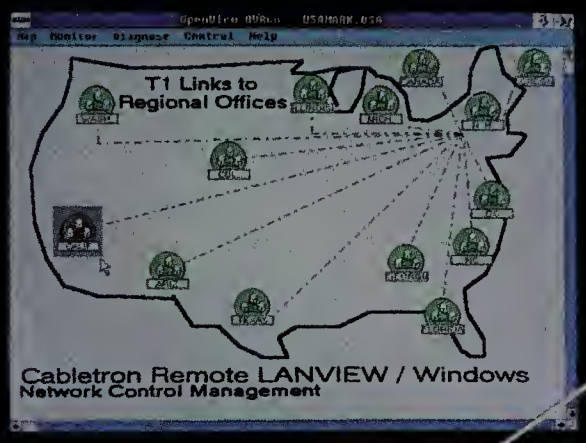

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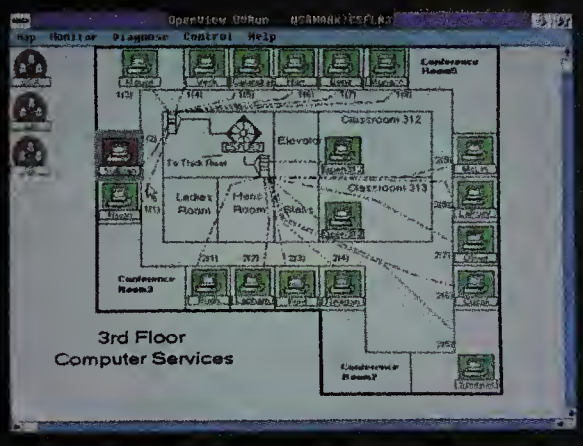

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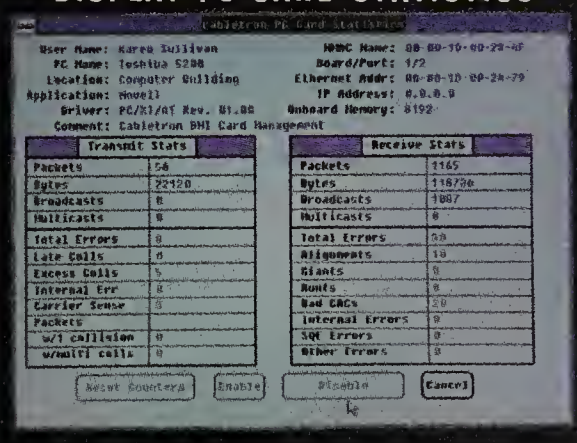

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Worth Noting

Rolm Co. recently said that it is developing software that will enable Rolm 9751s to be integrated with Digital Equipment Corp. VAXes under DEC's Computer Integrated Telephony program, but it declined to say when the software will be available.

Carrier Watch

Metropolitan Fiber Systems, Inc. (MFS) recently began providing alternative access services on its bypass network in Pittsburgh. The net consists of 144 cables and 855 fiber route-miles.

The MFS net serves roughly 15.5 million square feet of office space in the city's Golden Triangle business district, stretching from Stanwix Street and the Boulevard of the Allies to 32nd Street in the Strip District. MFS is providing a variety of services on the network, ranging from digital data services to T-3 links. The company said it offers faster circuit installation intervals than Bell Telephone Co. of Pennsylvania, around-the-clock network surveillance and maintenance, and dedicated building-to-building circuits.

Advanced Telecommunications Corp. (ATC), a long-haul carrier based in Atlanta, recently completed the acquisition of more than 4,000 customers in San Antonio and Kerrville, Texas, from **Long Distance Discount Service (LDDS),** a Jackson, Miss.-based carrier. With the addition, ATC's installed customer base in Texas exceeds 56,000. In a separate transaction, ATC sold its installed base in Arkansas, Kansas and Tennessee to LDDS for an unspecified sum. These transactions are consistent with ATC's strategy of focusing its marketing efforts in tight geographic areas.

Warner's Vnet use climbs

	1989			1990
Time	**2nd quarter**	**3rd quarter**	**4th quarter**	**1st quarter**
Vnet sites	2	16	33	48*
Traffic: (in millions of minutes per month)	0.3	1.840	2.782	3.490

* Vnet with 48 sites consists of eight dedicated access sites and 40 switched access sites.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: WARNER COMMUNICATIONS, INC., NEW YORK

Three users detail virtual net projects

Steelcase, Warner and Westinghouse find that the nets help them trim costs, manage change.

By Bob Wallace
Senior Editor

NEW ORLEANS — Three prominent companies detailed how they have used virtual network services in place of or to augment private voice networks at the recent International Communications Association conference here.

The users, Steelcase, Inc., Warner Communications, Inc. and Westinghouse Communications, said virtual networks have enabled them to sharply reduce communications costs, trim staff and better manage change.

Although Warner and Westinghouse encountered no significant problems cutting over sites to their virtual networks, Steelcase endured an implementation described as nightmarish.

Warner network

Early last year, Warner had a dozen autonomous sites that were using a mix of outbound calling services from six different long-haul carriers, according to Dennis Murphy, telecommunications director for the $5 billion entertainment conglomerate.

To bring continuity to the service mix, Murphy set out to devise a single net plan to support these and other sites.

Eventually, Warner chose MCI Communications Corp.'s Vnet service over a six-site private network because it did not have the staff required to run a dedicated net. "We wanted to use the carrier to handle our management and operations work," Murphy said. "We found [Vnet] to be a very simple and easy way to introduce networking to an autonomous, highly decentralized organization."

Warner's virtual net, which initially supported two West Coast sites and the company's headquarters, and which carried 200,000 minutes of traffic a month, has expanded to a 48-site network that handles 1.2 million minutes of traffic a month.

Warner uses T-1 and T-3 links to tie eight high-volume sites to MCI Vnet points of presence. Forty smaller sites use switched access to the carrier's network. Five growing switched access sites will soon use dedicated Vnet access.

Roughly 85% of Warner employees use the network — a percentage Murphy expects to increase to 99.5% by year end. Vnet costs an average of seven to eight cents less per minute than the outbound calling services the company previously used.

The Warner network carried two million calls in the last quarter, and the company logged only 32 trouble tickets, or one per 62,500 calls. Only 15 were related specifically to Vnet service, Murphy noted. Warner expects to save $1.1 million a year by replacing outbound calling services with virtual net service, he added.

Steelcase

Steelcase, a $1.8 billion office furniture manufacturer based in Grand Rapids, Mich., said it expects to save $1 million by 1994 using AT&T's Software-Defined Network (SDN) to replace 800 service linking company locations to its world headquarters.

"When we decided to go with SDN about a year ago, we did it purely for monetary reasons," said John Crankshaw, telecommunications manager for Steelcase.

Steelcase adopted a three-phase SDN implementation for its virtual net, which is dubbed CaseNet. The company cut over 29 dedicated access sites, primarily sales offices and manufacturing plants, in October 1989 during the project's first phase.

"The implementation was a nightmare," Crankshaw recalled.

(continued on page 14)

User representation vital to future of the public net

ICA speaker says users must protect interests.

By Anita Taff
Washington Bureau Chief

NEW ORLEANS — Telecommunications has become so important to most companies that discussions about the future of the public network must move from the wiring closet into the mainstream of corporate awareness.

Speaking at the International Communications Association's (ICA) recent conference here, Michael Crampton, director of telecommunications public policy and industry analysis at The Travelers Corp., said users must get more involved in the policy process. He offered a plan that could help companies organize lobbying efforts.

Until now, carriers and state consumer groups have dominated the public policy debates over the regulation of telephone companies. "Because business customers have not been in the loop, their interests have not been effectively represented," Crampton said.

Although businesses are represented by users groups such as the ICA on federal regulatory matters, it is too difficult for the ICA to step in at the state level, Crampton said.

Since it is difficult for individual businesses to take a more active role in shaping public policy, companies should band together and form state users groups. Crampton helped form a users group in Connecticut to push for the introduction of intrastate competition from long-distance carriers.

Crampton outlined a nine-point plan that users can follow in developing such groups:

- Identify corporate telecommunications users who share your interests, usually companies with headquarters or major operations in your state.
- Develop a mission and shared set of objectives. A strategic view will help enhance group cohesiveness.
- Establish the group on an ad hoc basis. The group should have no dues or set schedule. Meeting on an as-needed basis will conserve telecommunications managers' scarce time.
- Develop a telecommunications/government affairs partner. Telecommunications experts should craft proposals on regulation, and a government affairs expert from the company should deliver the message to policymakers.
- Use hired guns sparingly. The ad hoc group should formulate positions on regulatory issues

(continued on page 14)

WASHINGTON UPDATE

BY ANITA TAFF

AT&T investing big in politics. AT&T has the richest corporate political action committee in the country, taking in almost $2 million and contributing about half of that to federal campaigns last year. According to figures released last week by the Federal Election Commission, AT&T's committee raised $1.8 million from January 1989 through March 1990. During that period, the committee contributed $828,985 to federal politicians. The rest of the funds were spent on state or local elections, or are being held as cash on hand.

AT&T's contributions were the third highest of any political action committee, including those not affiliated with corporations. But AT&T was the richest corporate contributor, pouring twice as much money into federal campaigns as the next nearest corporate political action committee, that of Federal Express Corp. Four other phone companies were ranked in the top 50 corporate contributors last year.

GTE Corp., which has a telecommunications group, was the 25th highest contributor to federal campaigns last year, spending $172,175. US West, Inc. spent $162,675 on federal campaigns, making it the 28th highest corporate contributor. Southern Bell Telephone Co. and Pacific Telesis Group spent almost the same amount on federal campaigns last year, making them the 35th and 36th highest contributors respectively. Southern Bell's committee spent $148,150 while Pacific Telesis spent $141,560.

Users detail virtual nets

continued from page 13

"We were installing SDN at the end of [an AT&T] promotional period. The promotion created a volume of work they weren't prepared for." A number of cutovers were delayed.

In Phase 2, Steelcase distributed to employees SDN calling cards that enable users to call in from the road.

To make an SDN call when away from the company, the employees dial zero, the telephone number of the party, an authorization code and their personal identification number.

"With 800 service, people get a mindset that the call is free," Crankshaw said. "In addition, there is no accountability for 800 calls." SDN's network remote access and call detail reports enable the company to match the call with the calling party and bill the employee's department accordingly.

Steelcase is now in the final phase of the implementation, during which it plans to bring 550 of its furniture dealers, eight design firms and 500 overseas sites onto CaseNet. All of the sites will use switched access to CaseNet, Crankshaw said.

Numerous SDN rate reductions as well as promotions that enable users to add SDN sites for free have boosted Steelcase's savings over WATS from the 5% a year initially expected to 28% annually. Crankshaw said CaseNet boasts 99.98% availability, which amounts to about two hours of outage a year.

Crankshaw said he was generally pleased with AT&T's support to date. "The commitment to [an SDN project] has to come all the way from the technicians on up to the people at the [carrier's] network control center," he said.

Westinghouse

Westinghouse is one of but a few companies that use virtual network services from all three top carriers. Tom O'Toole, director of communications systems for Westinghouse Communications, said the company has a number of locations across the country and the only way to serve them is to give them switched access to a virtual net.

Westinghouse initially used SDN, Vnet and US Sprint Communications Co.'s Virtual Private Network (VPN) to link small company locations to its nationwide T-1 backbone network. Now even Westinghouse customers can use the service toward the same end, O'Toole said. The services are also used to handle private network traffic overflow.

The company's private network is based on six Northern Telecom, Inc. DMS-250 central office switches interconnected using T-1s and collocated at MCI points of presence, O'Toole said. Sites can use either switched or dedicated facilities to access any one of the carrier's virtual network services.

Although the carriers' virtual network features are somewhat similar, US Sprint has the "purest" switched 56K bit/sec capability because it is the only carrier of the top three with an all-digital network, O'Toole said. AT&T and MCI have to bypass analog parts of their network to offer switched 56K bit/sec service to virtual network users.

US Sprint's VPN comes up short in some areas though. O'Toole said he wants US Sprint to offer a VPN-based automatic ringdown feature and a virtual foreign exchange line capability, both of which are currently offered by AT&T and MCI.

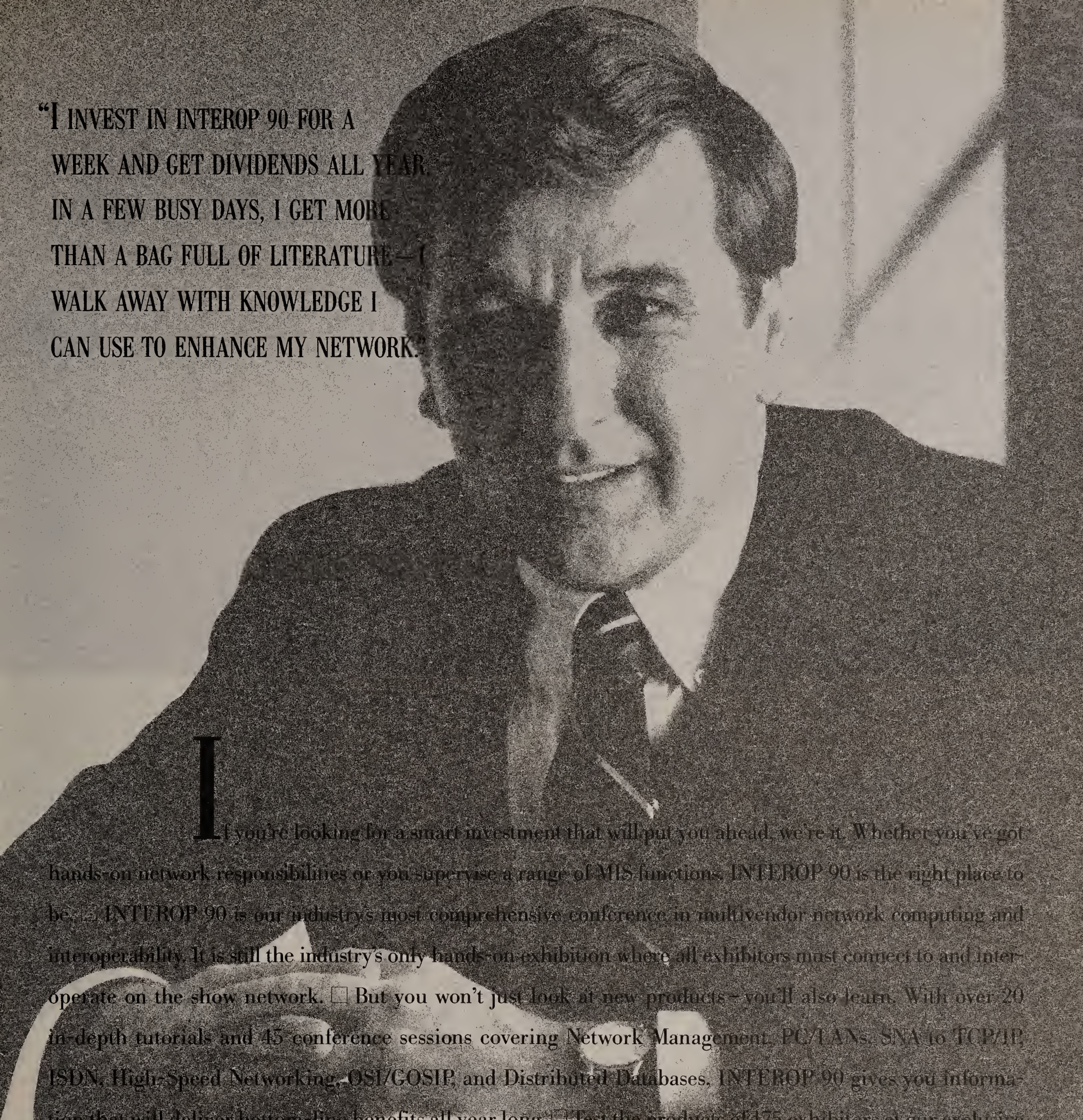
Representation vital to future

continued from page 13

themselves and turn to attorneys or consultants only when help is needed to flesh out positions or make formal filings.

- Practice what you preach. Utilize communications technologies such as electronic mail and teleconferencing to conduct the group's work.
- Include industry-specific business associations. Form alliances with other groups, but be careful not to get gobbled up and lose the identity of the ad hoc group.
- Establish a dialogue with other stakeholders and maintain the group's visibility before policymakers.
- Conserve resources as well as time.

See The FAXNet Form on Page #68



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DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

One peak hour can generate 40% of System One Corp.'s weekly revenue, and one minute of downtime can cost the company $1 million, according to Kim Small, director of technical studies for the company. System One runs the computer reservation network that serves Continental Airlines Corp. and Eastern Air Lines, Inc.

Data Packets

Consumers Software, Inc., Eicon Technology Corp. and **Sprint International** last week announced they will together offer a series of seminars intended to provide users with information on the installation, cost-justification and management of X.400 systems.

The seminar costs $25 per attendee. Dates and cities are as follows: June 11, Chicago; June 13, Dallas; June 15, San Francisco; June 18, Los Angeles; June 20, Atlanta; June 22, Washington D.C.; and June 25, New York.

For more information or to register, call (800) 663-8935 between 8:30 a.m. and 5 p.m. Pacific Standard Time.

IBM last week awarded a $12 million, five-year contract to **Contel ASC** for satellite transmission services, net monitoring and control, and maintenance to support its internal Corporate Education Network (CENET) video net.

CENET broadcasts interactive educational programs on such topics as engineering, finance, manufacturing and planning to 27 IBM sites around the country. IBM uses three studios as central classrooms from which video, audio and data signals are transmitted to remote sites via satellite at T-1 speed.

Fujitsu, Racal-Milgo pack features in new DSU/CSUs

Fujitsu offers LN DSU; Racal-Milgo ups Excalibur.

By Paul Desmond
Senior Editor

NEW ORLEANS — Fujitsu America, Inc. and Racal-Milgo both introduced data service unit/channel service units (DSU/CSU) at the International Communications Association's annual show here late last month.

Fujitsu unveiled the LN DSU, a net-managed unit with a CSU that works with standard digital data service (DDS) lines, DDS2 lines — which include a sideband for net management data — switched 56K bit/sec and clear-channel 64K bit/sec services.

Racal-Milgo announced the expansion of its Excalibur line with a new DSU/CSU that packages features currently offered separately in 12 existing Racal-Milgo DSU/CSUs. The Excalibur line previously supported only analog transmission products.

The new Excalibur device supports three key features: multiport, multimode and multirate.

The multiport feature refers to Excalibur's six-port time-division multiplexer (TDM) and multidrop capability. This feature lets users run as many as six different protocols over one multidrop digital line, said Francis Roumillat IV, product manager for Racal-Milgo's digital access products.

In addition, Excalibur supports carrier-provided subrate data multiplexing services, in which five 9.6K bit/sec circuits from separate remote locations are multiplexed onto a single 56K bit/sec line being fed to a central site.

The multimode feature refers to the various carrier services supported by the new Excalibur model. Net management data is supported on DDS2 lines and on standard DDS lines, although on the latter only by interrupting the normal data flow.

Support for noninterruptive net management data on standard DDS by using a bit-stealing scheme is due out in August. The device also works with clear-channel 64K bit/sec circuits as provided by fractional T-1 services, such as AT&T's Accunet Spectrum of Digital Services.

Excalibur's multirate feature refers to the various digital line speeds — ranging from 2,400 to

(continued on page 18)

Creditors get fast payment with Quick Collect service

By Jim Brown
Senior Editor

UPPER SADDLE RIVER, N.J. — Banks and debt collection agencies are praising an electronic funds transfer service that enables them to receive past due payments quicker.

The 6-month-old Quick Collect service, offered by Western Union Financial Services, Inc., based here, is supported by Western Union Corp.'s existing X.25 backbone network.

To use the service, debtors who are delinquent paying bills pay cash to a Western Union agent. That agent then enters the payment on a microcomputer and transmits it over Western Union's packet-switched network to a participating bank or collection agency where a Western Union printer generates a check for the payment amount.

Alternatively, agents without microcomputers call the payment into a Western Union customer service center, where the payment is entered on a terminal and forwarded to a printer.

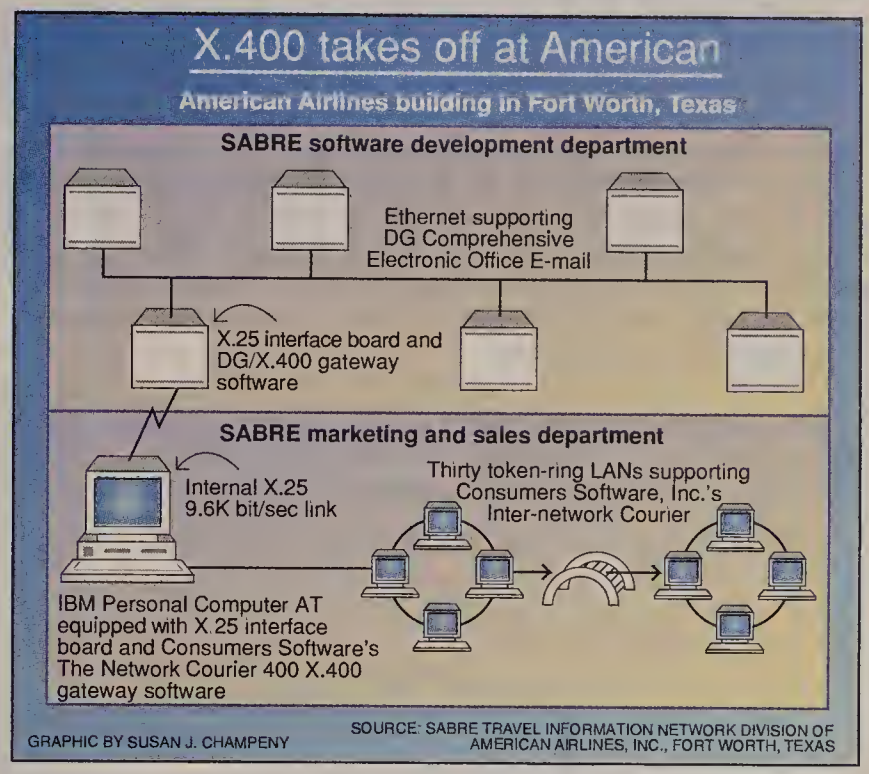
Debtors are charged an $8.50 transaction fee to use Quick Collect, which is designed to transfer funds to the bank or collection agency within 15 minutes. The service helps debtors avoid further late payment charges and damage to their credit ratings by beating payment deadlines.

"This expedites getting payments to us," said Fred Eddy, vice-president of administration for CIT Sales/Financing, Inc., which finances the purchase of mobile homes and recreation vehicles.

Eddy said his firm started using Quick Collect three months ago and has seen an increase in the number of customers who use the system to pay late bills.

Several thousand of the 15,000 Quick Collect agents are equipped with microcomputers running Western Union proprietary software. The microcomputer forwards an electronic funds transfer message to the nearest Western Union X.25 switch, called an Access Node Controller (ANC), via an asynchronous dial-up link.

(continued on page 18)



Airline ties disparate mail nets via X.400

American Airlines connects CEO, Inter-network Courier E-mail users with dual X.400 gateways.

By Tom Smith
New Products Editor

FORT WORTH, Texas — In its first major implementation of the X.400 messaging protocol, American Airlines, Inc. recently said it has linked 650 users on two proprietary electronic mail systems in a single building.

The two networks in the airline's SABRE Travel Information Network Division are joined via X.400 gateways, letting users of Data General Corp.'s Comprehensive Electronic Office (CEO) and Consumers Software, Inc.'s Inter-network Courier exchange messages for the first time.

SABRE said it hopes to convince the 16,000 travel agencies currently on its SABRE reservation network to adopt X.400 so they can communicate electronically with large corporate travel customers using disparate E-mail systems that also would support the messaging protocol, according to Terry Jones, vice-president of product development.

The SABRE Travel Information Network Division markets the SABRE network worldwide, develops internal products and markets existing products — such as the Inter-network Courier — to SABRE travel agents.

American Airlines used Consumers Software's The Network Courier 400 gateway software — running on an IBM Personal Computer AT — to translate into X.400 format messages forwarded to it by 500 Inter-network Courier users on 30 token-ring local-area networks running Novell, Inc.'s NetWare.

The Personal Computer AT gateway is linked via a 9.6K bit/sec X.25 line to a DG MV minicomputer running DG/X.400, DG's X.400 gateway.

That product translates into X.400 format CEO messages generated by 150 dumb terminal users supported by five MV minicomputers linked via Ethernet. The two gateways facilitate a message transfer process that previously was cumbersome at best.

"Before when I had to send a message to the people working for me, I either had to have it typed into one system and then the other, or I'd send E-mail to one [group] and then print out the message and mail it to the people [on the other system]," Jones said. "So they were getting things late."

> Users can address messages to aliases and have them sent to users on either E-mail system.
>
> ▲▲▲

By contrast, users can now address messages to aliases and have the message sent to users on either E-mail system, with the gateways handling translation and routing of messages.

"The nice part is that neither of us have to worry about whether the other guy is on a different sys-

(continued on page 18)

Airline ties disparate mail nets with X.400

continued from page 17

tem," Jones said.

X.400 is allowing SABRE Travel Information Network Division employees with different responsibilities to communicate electronically for the first time.

The users supported by the DG minicomputers are primarily software developers. The 500 users on the token-ring LANs are in a variety of departments, including marketing and sales. The two groups often trade messages, mostly regarding meeting times and subjects, Jones said.

"It didn't make sense to make our developers switch from dumb tubes to PCs just to get E-mail," Jones said. "It was much better to just interconnect the two systems."

Inter-network Courier users can already communicate with a "couple thousand" other SABRE employees in multiple buildings that use IBM's Professional Office System (PROFS) through a PROFS gateway manufactured by Consumers Software, Jones explained.

The company's strategic direction, however, is to eventually implement an internal E-mail system, dubbed InterAAct, which is based on Hewlett-Packard Co.'s DeskManager III E-mail and office automation product, Jones said.

It has not yet been decided if the employees currently using X.400 will use that system or if they will have an interface to InterAAct.

SABRE will continue to market Inter-network Courier to travel agencies. In addition, it plans to offer by this summer a gateway capability so Inter-network Courier users can communicate with one another over the SABRE network without using X.400.

SABRE is currently exploring with public network E-mail vendors the feasibility of providing X.400 links between SABRE travel agents and their travel customers to simplify communications.

"It's going to be a great competitive advantage for our customers if they're able to communicate with their travel customers via electronic mail," Jones said.

Such a capability could be available as early as the end of 1990 or the beginning of 1991, he added.

Fujitsu, Racal pack features in DSU/CSUs

continued from page 17

64K bit/sec — supported by the unit. TDM port speeds range from 75 to 19.2K bit/sec asynchronous and from 2,400 to 64K bit/sec synchronous.

The device also supports dial backup on two-wire analog circuits at 14.4K bit/sec or on four-wire switched 56K bit/sec services. Two-wire switched 56K bit/sec service will be supported in the first quarter of 1991, Roumillat said.

The first Excalibur shipments will begin June 14, although various features will ship at different times until the third quarter, when all features will be available. Pricing varies according to configuration, ranging from about $1,200 for a central-site, single-port unit to about $3,300 for a full-featured model.

Fujitsu pushes options

Fujitsu stressed the multiple types of digital services with which its new LN DSU works and the product's restoral capabilities.

The LN DSU comes standard with support for DDS, DDS2, clear-channel 64K bit/sec, subrate data multiplexing or switched 56K bit/sec services. Network management, although intended mainly for use with DDS2 service, also works with standard DDS as long as the user's data is not running at the full 56K bit/sec offered with the service.

The LN DSU can transmit at speeds of 64K, 56K, 19.2K, 9.6K, 4.8K and 2,400 bit/sec. It also supports 56K bit/sec to subrate conversion, which lets users lease 56K bit/sec lines even though their terminal equipment is running at a slower speed. Carriers sometimes lease 56K bit/sec lines at a lesser rate than lower bandwidth links.

Restoral options include the use of a second DDS or DDS2 line, four-wire switched 56 or analog lines at 9.6K bit/sec.

When used with Fujitsu's FMS 1000 network management system, a time-of-day feature is supported that lets users define certain times when the unit will not go to dial backup mode. That eliminates the chance that the LN DSU will dial up a backup link at times when no users are transmitting data.

Prior to the LN DSU, Fujitsu offered only a non-network-managed DSU with no restoral capability.

Fujitsu is offering a special DSU insurance policy with the LN DSU. Should the device fail within the first year, Fujitsu will not only repair the LN DSU, it will give the user another DSU free of charge.

The LN DSU will be available in July for $1,795.

Creditors get faster payment with service

continued from page 17

The ANC wraps the asynchronous data in X.25 packets and forwards them to an asynchronous host here. That host uses a dial-up line to transmit the data asynchronously to the printer in the bank or collection agency, where the check is printed.

Western Union agents deposit money collected from debtors into their bank accounts. Western Union then uses an automated clearinghouse to electronically transfer those funds to its own bank account. The agent is also credited with a portion of the $8.50 transaction fee.

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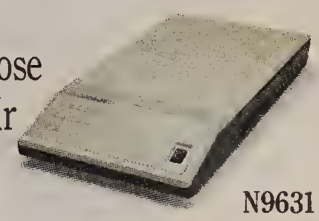

N9631

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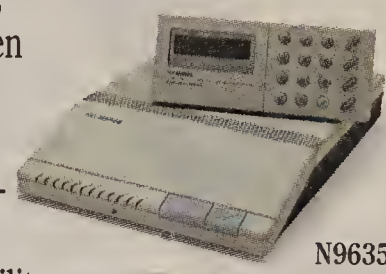

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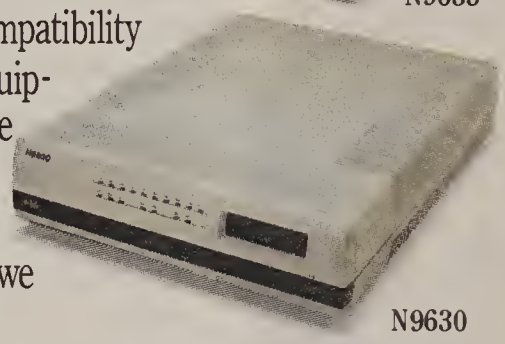

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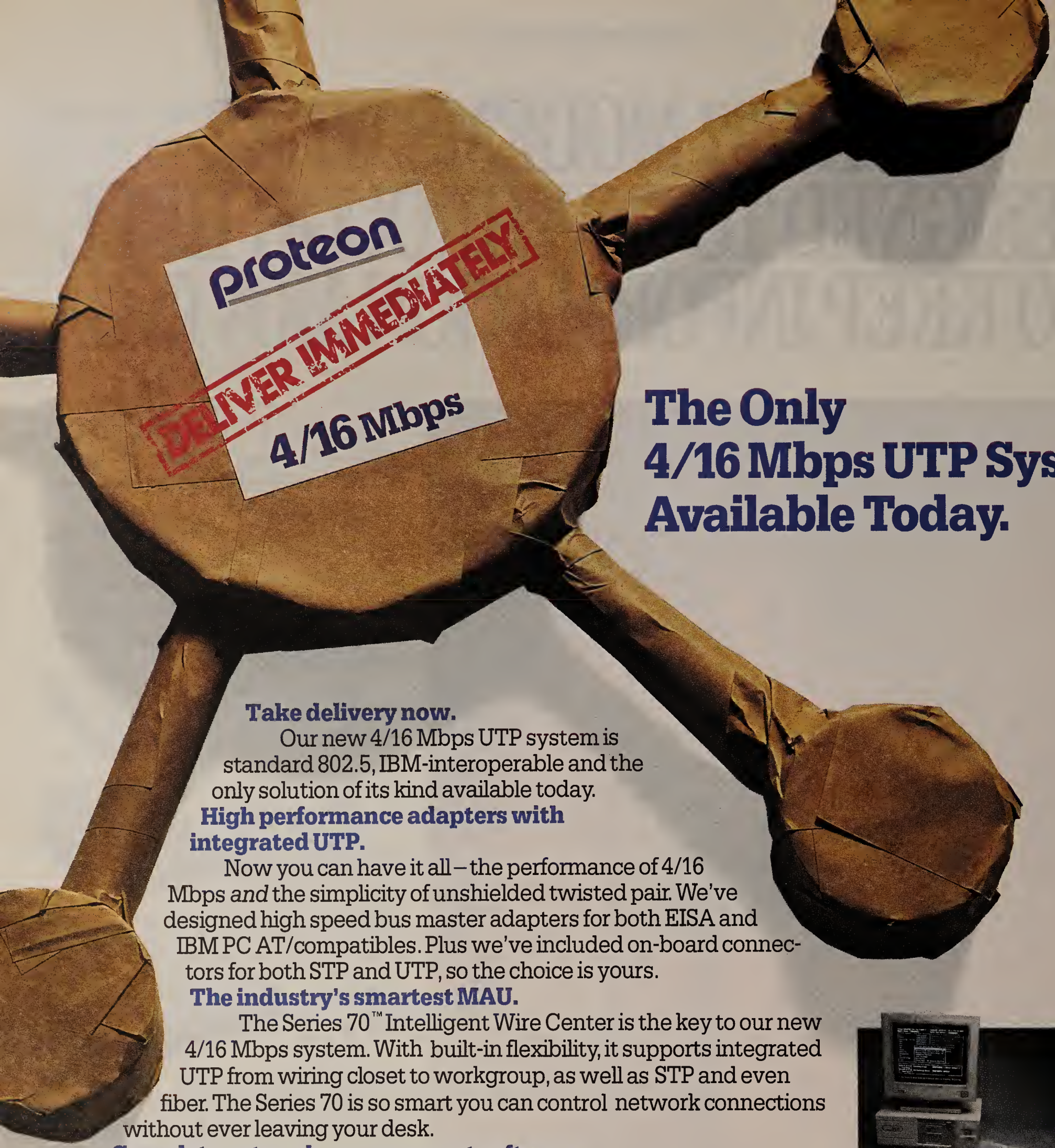
Photo courtesy of United States Forestry Services.

NEC

See The FAXNet Form on Page #68



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See The FAXNet Form on Page #68

Worth Noting

"Novell obviously left the groom [Lotus] at the altar. I can't see them being cozy after this but if any significant market opportunities arise, they'll work together. This just goes to show a letter of intent isn't worth the paper it's printed on."

Richard Dorfman
Associate
Broadview Associates
Fort Lee, N.J.

Netnotes

LAN Systems, Inc. of New York recently announced an enhanced version of its LANSpace memory extender that works with Novell, Inc.'s latest DOS client software to free up more memory for users on NetWare local-area networks.

LANSpace 2.0 lets users load either Novell's client NETx redirector shell or Internetwork Packet Exchange (IPX) drivers into extended memory, which produces a memory savings of 15K to 25K bytes.

When it is used with Novell's new client software, which allows the NETx shell to be loaded into expanded memory, LANSpace 2.0 provides clients with a NetWare environment that requires only 8K bytes of conventional DOS memory.

LANSpace 2.0 also lets users unload Network Basic I/O System protocol software from their systems without rebooting. Scheduled for release by the end of June, the software is priced at $495 per server.

Separately, LAN Systems announced the availability of LANSight, a network management utility that enables network administrators to monitor and control workstations, servers, bridges and gateways across a LAN or a wide-area

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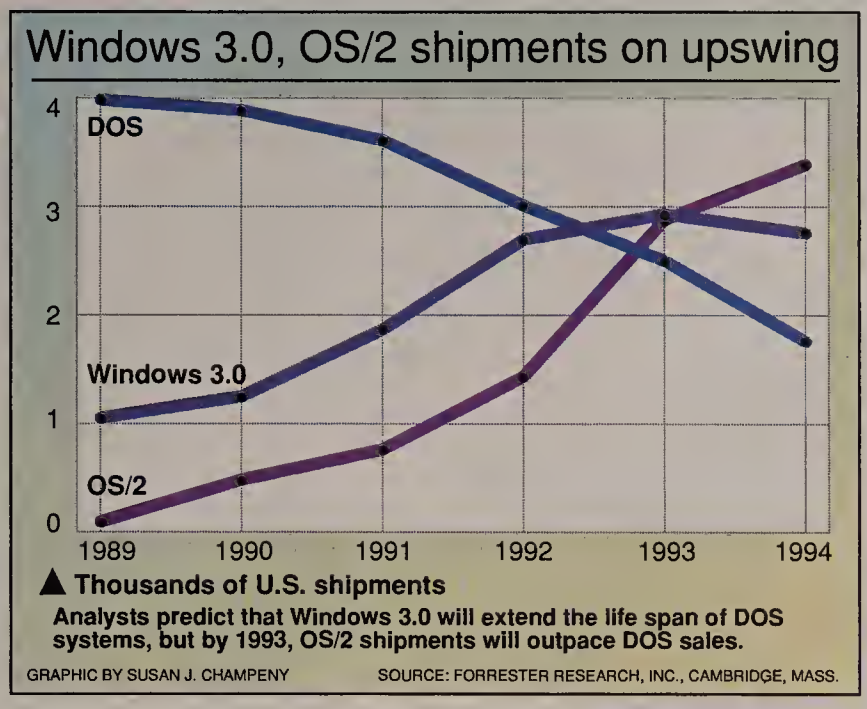

Upgrades in Windows 3.0 lengthens life of MS-DOS

But OS/2, LAN Manager to win in the long run.

By Laura DiDio
Senior Editor

CAMBRIDGE, Mass. — The graphical and networking enhancements in Microsoft Corp.'s newly released Windows 3.0 software will be good enough to prolong the life span of the MS-DOS operating system for the next three years, according to a new report by Forrester Research, Inc., based here.

The report, called "Desktop O/S Wars," is based on a survey of 55 independent software vendors. According to William Bluestein, an analyst with Forrester's Professional Systems Service, three million of the 30 million DOS users worldwide will adopt Windows 3.0 by 1993.

"After 1993, OS/2 and to a lesser extent, Unix, will be the predominant operating systems," Bluestein said. "DOS won't die anytime soon; price-sensitive users in the home office and small and midsize network users will fuel demand for DOS and Windows 3.0. But after this year, most application developers will direct their efforts to writing OS/2-based applications."

Bluestein and other industry analysts agreed that Windows 3.0 has a lot to offer DOS users.

Windows 3.0 has a vastly improved graphical user interface, frees users from the 640K-byte memory limitation of DOS and allows applications to address up to 16M bytes of memory. Additionally, Windows 3.0 for the first time enables personal computer users to access servers in any network that supports the Network Basic I/O System.

"Windows 3.0 is a smart move for Microsoft," Bluestein said. "It lets them keep current DOS users in the fold, as opposed to defecting to Unix, and gives them the opportunity to get people to migrate to OS/2 and LAN Manager over the next two to three years."

As useful as Windows 3.0 is, that will not be enough to compete in the long run with OS/2 and Unix as users expand their networks and require increasingly sophisticated networking capabilities and more powerful applications, according to the Forrester report.

"Even with Windows 3.0, DOS is still DOS, and its ease of use is a two-edged sword because it lacks the advanced features needed for networked applications," Bluestein said.

He noted that Windows 3.0 does not support multitasking and does not provide the security protection of OS/2. "If a user, for instance, is running three simultaneous windows and one application crashes, they all crash. That doesn't happen with OS/2," Bluestein said.

> As useful as Windows 3.0 is, that will not be enough to compete in the long run.
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OS/2 and LAN Manager have been "a flop until now" because the expectations of independent software vendors and end users have been unrealistic, he said.

"Eventually, though, OS/2 and LAN Manager will succeed because the plain truth is that OS/2 is a better operating system than DOS for client/server and heavily

(continued on page 24)

SMT portion of FDDI spec nearly complete

The standard for FDDI station management is the last of four FDDI components to be mapped out.

By Laura DiDio
Senior Editor

FRAMINGHAM, Mass. — Users that have been holding off on building Fiber Distributed Data Interface networks while awaiting completion of the station management portion of the FDDI standard can begin making installation plans because it is nearly finalized.

The availability of the station management portion of the 100M bit/sec FDDI standard, which defines specifications for monitoring and managing devices on FDDI nets and is the last portion of the standard to be mapped out, is expected to hasten general acceptance of FDDI networks.

"Now that we've gotten to a letter ballot, the standard is functionally complete," said Bruce McClure, a member of the ANSI FDDI committee and president of start-up Synernetics, Inc. in Billerica, Mass., a station management FDDI software developer.

"After several years of formulating the standard, it's now safe to say there will be no functional changes, just refinements as we find things that need correction," McClure said.

The ANSI X3T9.5 FDDI standard, which has been in the making for the past three years, consists of four separate components governing FDDI network connections.

The first three portions of the standard — the media access (MAC) layer, physical layer and physical medium dependencies (PMD) — were the easiest to complete because they are hardware specifications, according to McClure and Ron Perloff, president of XLNT Designs, Inc. (XDI), a San Diego-based station management developer and member of the ANSI committee.

The station management portion of the standard has presented the ANSI committee with its most daunting challenge because it involves all software, according to McClure and Perloff.

"The committee ended up

(continued on page 23)

Western Digital slashes prices on LAN adapters

By Susan Breidenbach
West Coast Bureau Chief

IRVINE, Calif. — Western Digital Corp., one of the first vendors to draw battle lines in the Ethernet price wars, has launched a new offensive by announcing additional price cuts and extending the warranty on all its local-area network adapters from one to five years.

Effective immediately, the listed price of its 16-bit EtherCard Plus 16 is $349, down from $399, and the price of the eight-bit EtherCard Plus is $249, reduced from $349.

The extended warranty applies to both boards, as well as to Western Digital's entire line of Ethernet, 10BaseT, Starlan and token-ring adapters.

Best of both worlds

The much greater drop in the price of the eight-bit board reflects the fact that Western Digital — which owns nearly a third of the Ethernet interface market — has seen a sharp shift in demand over the last year from its eight-bit to 16-bit products, said Bill Johnson, a marketing director in the company's microcomputer products division.

According to Johnson, the price cuts and longer warranty were possible because the company is a semiconductor manufacturer as well as a producer of controller boards. By contrast, most of Western Digital's competitors have to purchase third-party chipsets for their adapters.

"The companies that are going to survive in the LAN board price wars will be the ones that make their own silicon," Johnson predicted.

Western Digital's vertically integrated manufacturing capability enables the company to minimize costs and exercise more control over the entire design and production process — from semiconductor design and chip packaging to final board assembly and testing. This control results in a level of product quality and reliability that enables the company to offer five-year warranties, Johnson said.

Western Digital also has an-

(continued on page 24)

"If they can send a man to the moon, why can't they make my computers talk to each other?"

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SMT portion of FDDI spec nearly complete

continued from page 21

leaving some of the thorniest problems in the FDDI standard for us to deal with in [station management]," Perloff said. "This resulted in a reluctance in the end-user community to embrace FDDI because they've heard quite rightly that [station management] isn't quite cooked. We concentrated on the hardware to the detriment of the software."

Vendors that have interpreted the evolving standard and added some station management functionality to their products have not been able to guarantee full interoperability with other vendor devices. The lack of a standard has also limited the ability of end users to effectively locate, isolate and disable faulty nodes on FDDI nets.

McClure said the lack of a standard specification has effectively left network administrators in the dark when it came to station management.

"If they couldn't view the network, it made it that much more difficult to identify what's broken [on the network] and how the network is running during normal operations," McClure said. Station management "will expose the internal workings of FDDI nets."

Patrick Courtin, president of local-area network vendor Proteon, Inc. in Westborough, Mass., concurred. "Speed was never the issue. It's no big engineering feat to make a network that offers 100M bit/sec speeds; the real trick is in managing an FDDI network. Without [station management], users are faced with chaos," Courtin said.

Now that the specification has been solidified and sent out for final approval to the full ANSI membership, Synernetics and XDI are ramping up production of their respective SMT software offerings to sell to FDDI vendors for incorporation into their product lines.

XDI makes XLNT Manager, a C language source-code implementation of the station management draft standard network management protocol, which enables software developers to compile the code and integrate station management directly onto FDDI adapters.

Having the source code gives developers answers to any questions that might arise, Perloff said.

In addition, source code gives them the freedom to engineer their products so different portions of the code can run on separate processors.

"In certain instances, [running station management on separate processors] can improve the performance of individual FDDI user workstations," Perloff said.

XLNT Manager is shipping now. It costs $37,500 (reduced from $50,000) for a basic license. This will include the source code, maintenance and updates through the end of 1990.

Synernetics' Component SMT, which was the first commercially available product, is available as both a source-code product, like XLNT Manager, and as precompiled station manager software that is adapter-ready, featuring a set of predefined interfaces that enable FDDI system makers to integrate the same station management software directly onto an adapter, McClure said.

"We supply our FDDI vendor customers with a set of very well-defined interfaces between [station management] and the FDDI controller-based software and to network management applications," McClure said. "All that's left for them to do is integrate Component SMT into their FDDI LAN products, regardless of whether it's an adapter, a bridge, a router or an entire system."

The advantage to this latter approach, McClure said, is that FDDI vendors integrate Component SMT's systems interface just once, and all future product revisions will plug and play with the original interfaces.

"As the FDDI market matures and as refinements are added to the [station management] protocol standard, we'll supply software upgrades to keep users current with the standard so they don't have to do any further work," McClure said.

Component SMT is also available now. Pricing starts at $21,000 for the software, including documentation and source code for interfaces. Component SMT with 100-user licenses costs $39,500. Volume discounts are available.

While Synernetics and XDI constitute the bulk of current independent commercial station management offerings, other FDDI vendors are reviewing the make vs. buy option — that is, to continue with internal station management development work or simply buy from Synernetics and XDI.

Doug Gold, director of communications research at International Data Corp. in Framingham, Mass., said that for all but the largest FDDI vendors, it makes good financial sense to buy rather than go the internal development route because the ongoing support of station management products is very expensive.

Now that the specification has been sent out for final approval, Synernetics and XDI are ramping up production of their respective station management offerings.

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See The FAXNet Form on Page #68

Netnotes

continued from page 21

network. The software can provide real-time configuration information about a remote computer, such as the type of central processor, video adapter and network board it has.

LANSight can also determine the BIOS version it uses and whether it supports a mouse or has a math coprocessor.

In addition, LANSight can furnish a memory map of the remote system that lists the version of DOS being used, the NetWare shell version that is running and the location of all loaded programs. Additionally, the network administrator can get activity reports that detail IPX, Sequenced Packet Exchange and shell driver statistics.

LANSight requires NetWare 2.1 or higher; it is priced at $395 per server.

The software consists of a control program that runs on any DOS workstation with at least 512K bytes of memory and a 4K-byte client program that runs on the rest of the LAN nodes.

LAN Systems, Inc., 300 Park Ave. S., New York, N.Y. 10010; (212) 995-7774.

Upgrades in Windows 3.0

continued from page 21

networked applications, and that's the way the world is going," he said.

OS/2 takes a backseat

Bluestein said, however, that interviews with software developers convinced Forrester that Microsoft has decided to let OS/2 and LAN Manager efforts take a backseat to DOS and Windows 3.0.

"OS/2 is on the back burner. There's no way Microsoft can devote equal time and money to Windows 3.0 and LAN Manager. [Microsoft plans to spend $10 million to promote Windows 3.0 over the next six months.] At this point in the network operating system wars, the game is over and Novell, Inc.'s NetWare has won this round," Bluestein said. "What happens with the next generation is still open to question."

The winner in the next generation of network operating system wars will be decided on the basis of functionality, he said. And it is in this area that OS/2 excels.

"Fifty-five percent of the software developers we spoke with said functionality is OS/2's — and by association, LAN Manager's — biggest strength," Bluestein said. "NetWare is mainly associated with the small and midsize user DOS-based LANs. Novell will have to work hard to convince users that it can play in the big leagues alongside LAN Manager."

Western Digital slashes prices

continued from page 21

other ace in the hole that could pay off big in future LAN adapter battles: The company makes the core-logic chipset that is used on the motherboards of a good portion of the IBM-compatible personal computers being manufactured today.

The core-logic device sits between the system's CPU and all peripherals — both those on the system board, such as the serial and parallel interfaces, and boards such as LAN adapters that plug into the expansion bus. It controls the access these peripherals have to the CPU.

Because each system manufacturer implements the AT expansion bus a bit differently, third-party adapter manufacturers generally have to support a lowest common denominator of functionality and thus cannot fully exploit the capabilities of a particular bus, Johnson said.

However, Western Digital can design its adapters to operate in a bus-specific mode if they are in a machine that also has a Western Digital core-logic chip. According to Johnson, this produces at least a 25% improvement in expansion board performance due to increased bus throughput.

Currently, only Western Digital's disk controllers and video adapters can take advantage of this "bus-aware" feature, but Johnson said the capability will be extended to the company's LAN adapters in the future.

Western Digital Corp. can be reached at 2445 McCabe Way, Irvine, Calif. 92714, or by calling (714) 863-0102.

Worth Noting

"Nothing good is cheap; nothing cheap is good. You get what you pay for."

James Heatherly
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Schaumburg, Ill.

Association Watch

Professionals who want to examine the legal and audit issues surrounding electronic data interchange can sign up for a new on-line seminar entitled "EDI: Legal, Accounting and Records Issues," sponsored by **Connected Education, Inc.**

Beginning on June 25, the seminar will last one month. Students can dial into the on-line course from their home or office computer any time of the day to receive instruction. A second month-long seminar will begin Oct. 15.

The seminar is designed for nontechnical professionals such as lawyers, accountants, auditors and records managers. It will be based on the book, *EDI and American Law: A Practical Guide,* by Benjamin Wright, an independent lawyer specializing in electronic communications.

The seminar costs $575 with a copy of Wright's book and $500 without it. To register, call Connected Education at (212) 549-6509.

The **Communications Managers Association (CMA)** will hold a membership meeting and professional education program on June 14 in New York.

The theme of the day-long event will be disaster recovery. Speakers from Contel ASC, Teleport Communications Group, Bank of America and NEC America, Inc. will discuss a variety of issues related to responding effectively to network disasters.

CMA members will also vote on a new board of directors for the 1990-1991 year.

To register for the meeting, call (201) 766-3824.

Study shows ICA members expanding global networks

Survey explores network spending, other issues.

By Wayne Eckerson
Senior Writer

NEW ORLEANS — A survey of International Communications Association (ICA) members shows that companies are rapidly expanding their international networks.

The survey, sponsored by *The Wall Street Journal,* indicates that a growing number of U.S. businesses are expanding their international network budgets and buying more network services and products for use overseas than they did two years ago, when the newspaper last surveyed ICA members.

In addition, the survey found that service-related issues are assuming greater importance for network managers when making purchasing decisions.

The survey results were announced last month at ICA's 43rd Annual Conference and Exposition here and are based on about 300 responses to questionnaires sent out this spring to all ICA members.

The results represent about 90% of the total responses expected to be collected, according to an official of the newspaper, who said final results will be released later this month. The market research firm Erdos and Morgan, Inc. of New York conducted the survey.

The study asked ICA members about their use of communications equipment and services, purchasing decisions and future network needs. About three-quarters of the companies surveyed had revenues greater than $1 billion, and 78% had 5,000 or more employees.

International spending is up

More than two-thirds of the companies surveyed said they expect their international communications budgets to increase in the next two years, a 7% increase over 1988.

In contrast, spending on domestic communications is not expected to increase as rapidly as in the past. However, a majority of companies surveyed still said

(continued on page 28)

GUIDELINES

BY ERIC SCHMALL

Net managers need to broaden horizons

A pitfall many network managers fall into is that they get too wrapped up in the arcane world of bits and bytes, and fail to get involved in other areas of their organization.

Although network managers may be the acknowledged gurus of information transport, they run the risk of being perceived as technocrats whose value to the company doesn't extend beyond network control room boundaries. By focusing too narrowly on telecommunications, network managers can cut themselves off from people and information that can help them improve the service they provide to end users.

To avoid this pitfall, network managers should participate, if just in some small way, in companywide activities. By breaking out of the traditional telecommunications role, a net manager can gain a reputation as someone who cares about the organization; a team player whose interests far exceed the realm of voice and data lines.

This involvement can help net managers learn more about projects and problems than they could otherwise find out in their official capacity. Often, these managers will be alerted to a network problem area long before it blooms into a crisis. In addition, they are likely to overhear some candid remarks from end users about the reliability and usefulness of the company's network systems.

There are dozens of ways for network managers to broaden their horizons in their company. It could be as simple as volunteering for an ad hoc committee the company has formed

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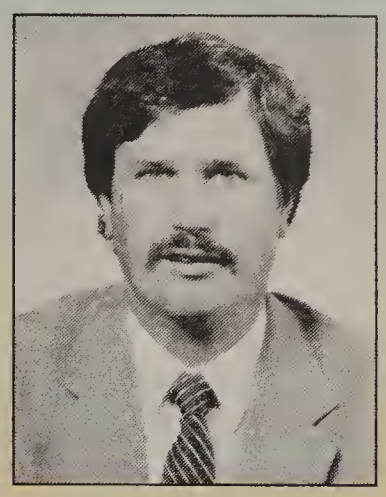
Schmall is the network systems manager at an insurance holding company.

MANAGEMENT PROFILE

"How do you get outside of your own world and into the customer's? First, you have to document what you can do for them, and then you have to go out to the divisions and show them."

Dan Trauscht
Manager of telecommunications
3M
St. Paul, Minn.



3M net exec gets down to business

Q&A

Network departments are often criticized for focusing too narrowly on technology and isolating themselves from the business issues facing their companies.

To address this problem, the 70-member telecommunications department at 3M in St. Paul, Minn., is being run as an internal business. Network product managers market a wide range of products and services to 3M's business units and are responsible for setting short- and long-term strategies, evaluating costs and product life cycles, and determining chargebacks.

Dan Trauscht, manager of telecommunications at 3M, heads up this innovative effort. *Network World* Senior Writer Wayne Eckerson recently spoke with Trauscht about the challenges and benefits of running a network department as a business and the implications it has for the network staff.

What steps are necessary to organize a network department to run as an internal business?

First, you try to define what [telecommunications] products and services you can offer [internal] customers. You can't talk with customers unless you have well-defined products to offer them. We have more than 35 products and services, which are described in a reference book we distribute to the business units.

Each product — such as switching systems, personal computer local-area networks and SNA networks — has a product manager assigned to it. These managers act like product managers in any other part of the company. They have to track the costs of delivering the product, estimate revenues and gauge product life cycles.

They are also the customer's first point of contact if they have questions or problems related to the product.

In addition, the product managers must chart industry trends, client requirements and internal or external factors that may affect the product's usefulness to the company. The product managers also must devise both short- and long-term strategic objectives for their products.

What are the advantages of operating a network department as an internal business?

It helps [the staff] understand the larger significance of what they're doing. Instead of just providing technical support, it forces them to think about why customers might want the service and how it will benefit them.

Also, forcing product managers to put these things in writing formalizes the entire process, helps clarify the elements involved in providing services to customers and reveals any shortcomings such as the lack of documentation.

Essentially, however, it doesn't ask them to do anything they shouldn't already be doing.

This approach seems to require technical staff to develop a good deal of business sense. How easy is it for them to adapt to this new role?

It's a real challenge for many. Often, they don't understand why they have to deal with business issues such as balance sheets, strategic planning and cost accounting.

For example, they have to account for all expenditures related

(continued on page 28)

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Study finds members expanding networks

continued from page 25

their domestic budgets would rise from 1990 to 1992.

Spending on international private lines will increase the most in the coming two years, according to the survey. In addition, a rising number of companies are expecting to spend more on long-distance services and local-area networks in the next two years.

Spending abroad for cellular telephone, facsimile and electronic data interchange will continue at previous levels, while less money will be devoted to modems, satellite transmission and voice messaging, according to the survey.

Domestically, ICA members will continue to broaden their use of network facilities and services, but particularly use of digital private lines, according to Bernard Flanagan, vice-president of marketing for *The Wall Street Journal*.

According to the survey, network managers consider service a top priority when buying telecommunications equipment or services. An overwhelming number of network managers (93%) cited service and technical support as important criteria influencing their purchasing decisions.

Other service-related concerns cited by a majority of managers were the vendor's willingness to work with customers after a sale, the vendor's ability to tailor services or products to customer needs or requirements, and availability of customized pricing. "Overall, factors that relate to service, cost and quality have increased in importance since 1988," Flanagan said.

He added that network managers are closely involved in making purchasing decisions for telecommunications equipment and services at their companies. Almost 90% of those surveyed are responsible for evaluating their companies' telecommunications needs, drawing up specifications and selecting suppliers.

However, slightly fewer network managers (78%) have the authority to make final purchasing decisions than in the previous survey, Flanagan said.

"[Network managers] are hands-on decision makers, but since 1988, [they] have lost some responsibility for the final purchase authorization," Flanagan said.

3M net exec gets down to business

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to their product — from carrier charges to depreciation to consulting fees. In the past, they would write up an order for $50,000 worth of software, submit it, and that was it. They never had to think about it again. Now, they must determine if it's a onetime event or a recurring charge, and how it will affect next year's budget.

We provide a lot of ongoing training and encouragement. Some people have picked things up quickly and are very willing to examine business and cost issues. Some do so down to the penny!

This approach holds network managers more accountable for their areas, but does it improve customer service?

What will be even more important in the future is to get our people out to the customers. Like telecommunications staffs at many companies, one of our shortcomings has been our ability to relate to the business of our internal customers and respond to end-user requests and requirements. We tend to be in our own world.

How do you get outside of your own world and into the customer's? First, you have to document what you can do for them, and then you have to go out to the divisions and show them.

How exactly do you do that?

This year, we will be assigning telecom managers to serve as sort of account managers to individual business groups in addition to their product responsibilities. These account managers will be asked to go out and visit clients a couple of times a month to talk and get a sense of the issues they're dealing with. It's difficult to understand why users complain about things until you're out there with them and can see things from their perspective. Then you understand.

It's important that we do this because users are getting smarter and applications and network requirements are getting more complicated. The closer we are to their operations, the better we can provide technical solutions to meet their needs. We have a lot to offer that users don't even know about. This will improve our ability to anticipate client requirements. Since it's impossible to install a major telecommunications system overnight, you have to be able to anticipate client requirements a year to two years down the road. You can't do that unless you're out with the clients on a regular basis.

Net managers need to broaden horizons

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to study some internal issues or review employee suggestions. Net managers could also join the company softball team, attend company social functions or spearhead a company-sponsored fund-raiser.

Network managers who contribute to the company outside of their area of expertise clearly gain a reputation as committed leaders. This not only enhances their ability to manage the network department, but makes them more valuable to the company as a whole. Network managers can vastly promote themselves and the network department by showing a willingness to contribute in ways that exceed the parochial realms of technology management.

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

Last month, the board of directors of the state-owned West German carrier, Deutsche Bundespost Telekom, approved a $1.2 billion loan to East Germany to help improve that country's telecommunications infrastructure.

World News

American Airlines, Inc., Northwest Airlines, Inc. and **United Air Lines, Inc.** recently reached an agreement with Annapolis, Md.-based Aeronautical Radio, Inc. to use Globalink, the firm's new mobile satellite communications service for in-flight airplanes.

Globalink utilizes four International Maritime Satellite Organization satellites to maintain network links among ground-based air traffic control personnel, airline operations personnel and in-flight airplanes.

Communications flow to and from airplanes and satellite earth stations in California, Connecticut, England, Japan, Norway and Singapore, and via terrestrial networks to and from the earth stations and air traffic control and airline operations centers worldwide.

Aeronautical Radio teams up with British Telecommunications PLC and national carriers in Norway and Singapore to provide the service.

Mobile satellite communications services such as Globalink are considered particularly important for international, transoceanic flights, in which they can be used to stay in virtually continuous contact with in-flight airplanes.

Currently, most transoceanic flights travel beyond the range of land-based radar systems. Airplanes must be tracked by having pilots use crowded radio airwaves to verbally inform air traffic controllers of their position.

New private-line tariffs coming to Canada

Carriers	Rate changes requested	Effective date
Bell Canada and British Columbia Telephone Co.	**Rate reductions (depending on distance):** • 64K bit/sec and T-1 circuits – 24% to 57%. • 56K bit/sec circuits – 20% to 56%. • Digital 19.2K bit/sec circuits – 3% to 15%. **Rate Increases:** • Voice-grade leased-line circuits – 7% to 31%.	By year end
Unitel Communications, Inc.	**Rate reductions:** • 56K and 64K bit/sec circuits – wants to charge rates 10% below Bell Canada's and British Columbia Telephone's requested rates. • T-1 circuits – wants to charge rates 15% below Bell Canada's and British Columbia Telephone's requested rates. **New services requested:** • Fractional T-1, 6.32M bit/sec private lines.	By year end

SOURCE: CANADIAN BUSINESS TELECOMMUNICATIONS ALLIANCE, TORONTO
GRAPHIC BY SUSAN J. CHAMPENY

Canadians tussling with tariff turmoil

Shift in regulatory oversight and prospect of new competition in switched services spurring change.

By Barton Crockett
Senior Editor

TORONTO — Tariffs in Canada are about to undergo an unprecedented series of revisions that should lead users to fundamentally reassess their use of network services in that country.

New tariffs have been proposed that would decrease some private-line prices by more than 70%, boost others by nearly a third, increase minimum billing periods for 800 calling services, raise prices for public packet-switching services and introduce new volume discount plans for calls from Canada to the U.S.

"Things have changed a lot in the past couple of years, but this year, things are really changing," said Brian Callihoo, president of the Canadian Business Telecommunications Alliance (CBTA), a Toronto-based users group, and manager of telecommunications with the London, Ont., brewer, John Labatt, Ltd.

Spurring the changes is a shift of regulatory authority from Canada's provincial governments to its federal government. This has forced carriers to refile tariffs, and many are using the opportunity to introduce new tariff structures.

Also contributing to the change is the prospect of new competition in the market for interexchange switched services. Last month, Unitel Communications, Inc., a Toronto-based private-line carrier, asked for permission to become the first carrier to supply switched long-distance services in competition with Canada's monopoly regional carriers, which work together to provide long-distance services.

Regulators are expected to rule on the request within 18 months ("Unitel files to break Telecom Canada's hold," *NW*, May 21). Callihoo said Canada's dominant carriers are reducing prices on popular services to deflect accusations of overcharging and make regulators less likely to approve the Unitel petition.

But, despite the clear political motivation to cut prices across the board, many of the rate revisions requested by Canada's carriers actually increase user network costs.

For example, Bell Canada, which serves Ontario, the Northwest Territories and Quebec, and British Columbia Telephone Co. have asked for rate reductions totaling 24% to 57% for interexchange 64K bit/sec and T-1 circuits, between 20% and 56% for 56K bit/sec circuits, and from 3% to 15% for 19.2K bit/sec digital data circuits. Price reductions vary by length of circuit (see graphic).

> Many of the rate revisions may actually increase user network costs.
>
> ▲▲▲

But the carriers have asked for increases of 7% to 31% for interexchange voice-grade circuits. Increases are also proposed for some public packet-switching services. For example, the carriers want increases of 10% for 1,200 and 2,400 bit/sec dedicated access ports to their public

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Knowing local customs is critical for global projects

Managers should hire locals, study social structure.

By Walter Sweet
West Coast Correspondent

The old adage "When in Rome, do as the Romans do" is particularly apt for users installing or operating international networks.

In addition to technical issues, such as the compatibility of products and regulations regarding use of certain technologies, users must cope with cultural issues when doing business overseas.

According to Cory Van Wolvelaere, a partner with Andersen Consulting, a unit of Arthur Andersen & Co., installing an international net requires managers to approach projects with a different business savvy, even if it's the same type of network being used in the U.S.

Van Wolvelaere, who has helped design networks for companies in 30 different countries, said it's important to go into a project with an open mind and use local help.

Trying to manage a project as if it were being done in the U.S. can be a recipe for failure.

"You have to adjust, not only from a technological perspective, but also from a cultural perspective," Van Wolvelaere said.

One way to help ensure the success on an international projects is to involve local people. They know the language, the culture and are more easily accepted than staff from the U.S.

> Trying to manage a project as if it were being done in the U.S. is a recipe for failure.
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Van Wolvelaere said you have to be particulary aware of protocol in countries with hierarchical social systems. In Japan, for ex-

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U.S. Cable & Wireless arm to offer service to Canada

By Barton Crockett
Senior Editor

NEW ORLEANS — Cable & Wireless Communications, Inc. plans to offer private-line services into Canada in July, company officials said at the recent International Communications Association annual conference here.

The company also revealed plans to petition the Federal Communications Commission for permission to offer switched services into Canada using its own facilities. Today, the company must use other U.S. carriers for switched traffic into foreign countries.

According to Charles Gibney, senior vice-president of marketing and sales for Cable & Wireless Communications, the U.S. subsidiary of London-based Cable & Wireless PLC, the carrier received FCC permission to supply private-line services into Canada earlier this year.

Public net link

He said the carrier will supply private-line services into the country using an international public network facility in Detroit, which will link Cable & Wireless' domestic network with the Bell Canada network.

Bell Canada will provide private-line links to Unitel Communications, Inc.'s network. Unitel is Canada's only alternative provider of terrestrial private lines. Among the private-line services supported will be T-1, fractional T-1 and dedicated analog circuits.

Promise of lower prices

Gibney said that if Cable & Wireless Communications is granted permission to use its own facilities to carry switched traffic into Canada, it would be able to reduce prices for its current switched service to the country and improve service quality.

According to Gibney, the current requirement to use other U.S. carriers to transport switched traffic into foreign countries limits Cable & Wireless Communications' ability to cut prices and decreases the quality of the switched link.

Gibney declined to predict when the FCC would give Cable & Wireless permission to use its own facilities to carry switched traffic into Canada, but said he was confident of a favorable ruling.

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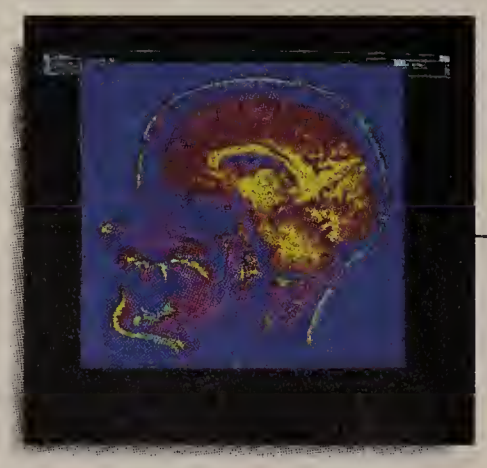

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Canadians tussling with tariff turmoil

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packet-switching networks, and 57% for 110 and 300 bit/sec dedicated access ports.

The carriers have also proposed requiring customers to use T-1 circuits to access 64K bit/sec clear-channel interexchange services. Users can currently access the services with 64K bit/sec local exchange circuits, but they must lease a minimum of four of the local lines.

CBTA said the requirement to use T-1 local access circuits could increase network costs for users that need fewer than five 64K bit/sec circuits on a single route.

CBTA added that even after rate reductions on some services, Canada's private-line prices would still be from three to 30 times more expensive than comparable AT&T private-line services in the U.S.

New 800 services

The 10 members of Telecom Canada, an association of most of the country's local carriers, have also petitioned the government for permission to offer new 800 services and to increase minimum 800 billing periods.

Callihoo said users are applauding the new 800 services, which would enable them to flexibly route calls between several service centers using various geographic, as well as time-of-day, -week and -year parameters.

But he sharply criticized the increase in the minimum billing period from six to 30 seconds. He said companies that use 800 numbers to handle calls of short duration, such as point-of-sale credit card verifications, could see network service costs increase between four and six times because of this change.

> Callihoo said users applaud the new 800 services.
>
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Callihoo added that users are also partial to a new service from Bell Canada, called Bell Advantage, that offers 15% discounts on more than $336 worth of standard international long-distance calls per month to the U.S., 17% discounts on more than $1,260 worth of calls per month and 20% discounts on more than $2,940 worth of calls per month. This new pricing arrangement took effect last March.

In the future, the network environment in Canada is likely to become even more complex as new carriers enter the market and existing carriers scramble to respond to the new rivals.

Callihoo said one of the most dynamic areas is likely to be the resale market, which he predicts will explode from about 18 to 20 resellers now to more than 100 next year because of a loosening of regulatory restrictions.

"Users will have to go out and build files on these companies and learn all about them," he said. "You'd have to be a fool not to."

Knowing local customs is critical

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ample, you probably would not suggest putting a workstation on the desk of an upper-level executive. Instead, lower-level employees have workstations and report to upper management.

Andersen's Cory Van Wolvelaere

The hierarchy system also establishes classes. "Don't take it personally if some people won't deal with you," Van Wolvelaere said. "They won't deal with you if you don't have the right title."

Differences can even crop up over seemingly minor things, like cigarette smoking. "Be prepared to sit through meetings in smoky rooms in Japan," Van Wolvelaere said. "If you ask them to put it out, they'll think you're rude."

Also, be prepared to work long days in Japan. "I don't think they see their families until 9 p.m. there," he said.

In other cultures, such as in the Middle East, network managers have to be aware of when offices are expected to be open to provide service. For example, in some countries, Friday is the Sabbath and all offices are closed, Van Wolvelaere said.

But the offices are open Saturday and Sunday for regular business. "That causes problems for providing support and the availability of personnel," he said. "You'd better be sure to have coverage on Sunday because they expect it."

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Cisco intros routing protocol for OSI nets

Cisco Systems, Inc. recently announced that its internetwork routers will support a proprietary routing protocol that will enable users to build nets based on the Open Systems Interconnection model.

Cisco Systems' **Interior Gateway Routing Protocol Intermediate System-to-Intermediate System (IGRP IS-IS)** is an alternative to the IS-IS protocol proposed by Digital Equipment Corp. as an International Standards Organization standard.

The network-layer routing protocol is used to maintain and update routing tables, and relay updated routing information in case of a link failure or when a new node is added to the network.

Cisco Systems will support DEC's proposed IS-IS protocol if demand warrants, according to Jim Forster, software development manager for the company. In the meantime, the company will promote IGRP IS-IS as an alternative.

Forster said IGRP IS-IS can accommodate larger networks better than IS-IS can. The new protocol is an upgrade to the company's existing IGRP protocol, which needed to be enhanced to support a new address format and to support areas defined in the OSI IS-IS protocol.

Areas define groups of hosts within a specific region so that routing does not need to be done on a per-host basis and, consequently, routing tables do not need to be as large as with protocols that do not support area routing.

IGRP IS-IS is offered on cisco Systems' CGS, MGS and AGS routers, which support up to four, eight and 32 wide-area connections, respectively.

Cisco Systems router users with service contracts can receive a free software upgrade. Others can upgrade for $500.

cisco Systems, Inc., 1525 O'Brien Drive, Menlo Park, Calif. 94025; (415) 326-1941.

Spectrum ports LU 6.2 pack to Stratus minis

Spectrum Concepts, Inc. last week announced a version of its **XCOM 6.2** software de-

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Contel VSAT service offers alternative to leased lines

Users require leased VSAT, line to Contel POP.

By Jim Brown
Senior Editor

ROCKVILLE, Md. — Contel ASC recently announced a two-way satellite data transmission service that is being positioned as a less expensive alternative to multidrop analog leased lines.

Contel ASC said the service, which has not been officially named, will trim about $100 off the average monthly charge for linking each site on a multidrop leased line to a central data center, provided customers commit to three to five years of service.

The service is targeted at customers that pay modem and circuit charges of at least $400 a month for each remote site on a multidrop 9.6K bit/sec analog leased line. Contel ASC said it will lease a very small aperture terminal and transmission services to customers for $300 a month per site for a three- to five-year contract. Rates for shorter contracts have not been set.

The service is based on Contel ASC's existing Data Messenger Network (DMN) 2000 VSAT, which has been available since 1986, and terrestrial lines supplied by Contel Corp.

To provide the service, Contel ASC will equip each remote site with a DMN 2000 VSAT, which consists of a 1.4-meter satellite dish and satellite modem. The DMN 2000 supports multiple protocols including IBM's Synchronous Data Link Control and Binary Synchronous Communications.

The DMN 2000 VSAT at each customer site will beam data off a Contel ASC satellite at 9.6K bit/sec to a satellite earth station at a Contel ASC shared hub in Mountain View, Calif.

The shared hub will transmit the data via Contel Corp.'s backbone network to the Contel Corp. point of presence (POP) nearest the user's data center. The user must then lease a 9.6K bit/sec circuit from the local exchange carrier or use bypass technology to transmit the data from the Contel POP to the data center.

The DMN 2000 VSAT broad-

(continued on page 36)

US Sprint unveils low-end switch for TP4900 family

By Barton Crockett
Senior Editor

NEW ORLEANS — US Sprint Communications Co. recently unveiled a low-end packet switch to add to its TP4900 line that costs about 40% less than its previous entry-level model.

At the International Communications Association conference here last month, US Sprint also announced delivery dates for T-1 and frame-relay support on its existing line of packet switches, and an expansion in the number of local carriers that support switched access to the carrier's switched digital service.

The new low-end packet switch, the TP4944, transmits 3,000 packet/sec in 128-byte packet sizes, the company said. The TP4944 supports as many as 96 asynchronous ports or up to 80 synchronous ports. The switch comes with 24M bytes of memory. It will be available in the third quarter of this year at a cost of about $39,000.

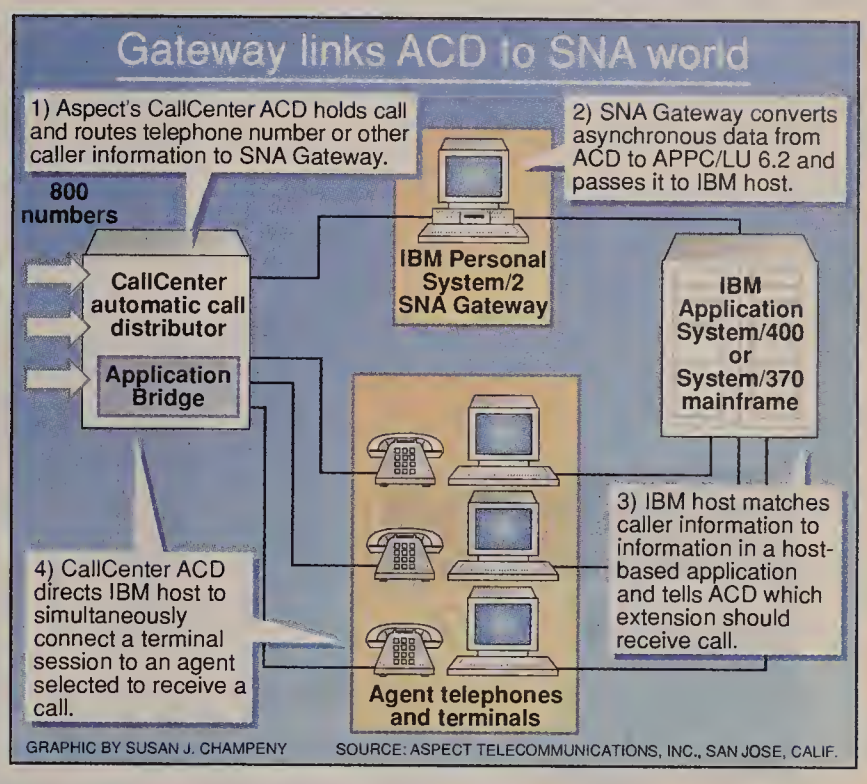
Currently, the carrier's smallest packet switch, the TP4952, supports as many as 192 asynchronous ports or 128 synchronous ports, transmits 11,000 packet/sec and costs about $64,000.

According to company executives, about 150 TP4900 packet switches are currently in use — about half in user and half in carrier networks. The new TP4944, as well as the TP4952, TP4954 and TP4956, are targeted primarily at user networks, while the high-end TP4974 and TP4976, which can cost more than $500,000, are used almost exclusively by carriers and value-added network service providers.

US Sprint also specified anticipated delivery dates and prices of T-1 and frame-relay support for its entire TP4900 line of packet switches. Last year, the carrier announced its intention to support these features but did not discuss availability or pricing.

The T-1 card is expected to be available in the third quarter of the year and will cost between $30,000 and $70,000. It will sport two Motorola, Inc. 32-bit microprocessors and will handle transmissions across the entire 1.544M bit/sec capacity of a T-1 link or separate 64K bit/sec channels on a T-1 link.

(continued on page 36)



Software links ACD to SNA environment

SNA Gateway converts asynchronous data into APPC/LU 6.2 for communications with IBM host.

By Tom Smith
New Products Editor

SAN JOSE, Calif. — Aspect Telecommunications, Inc. recently introduced software that enables its automatic call distributors (ACD) to send caller information to IBM host computers running integrated voice/data applications.

The product, SNA Gateway, translates asynchronous messages, such as incoming telephone numbers or account information entered by a caller, into IBM's Advanced Program-to-Program Communications/LU 6.2 protocol for communications with a Systems Network Architecture host. The company claims its ACD is the first to offer connectivity to SNA environments via APPC/LU 6.2.

The gateway resides on an IBM Personal System/2 that provides the physical link between an Aspect CallCenter ACD and an IBM Application System/400 minicomputer, System/370 mainframe or Personal System/2 microcomputer.

CallCenter ACDs range in size from support for 100 agents and 120 incoming trunks to support for 304 agents and 408 trunks. They can be linked to all major private branch exchanges, including those from AT&T, Northern Telecom, Inc. and Rolm Co.

SNA Gateway resides on the CallCenter ACD and works in tandem with Aspect's Application Bridge, which communicates asynchronously with as many as five computers, such as Digital Equipment Corp. VAXes or IBM Personal Computers. The Application Bridge, however, cannot support synchronous SNA applications, according to Dennis Haar, vice-president of marketing for Aspect.

In a typical application, a telephone number or account number entered by a caller from a push-button phone will be received by the Application Bridge, which sends the asynchronous information to the SNA Gateway as if it were sending that data to an asynchronous computer.

Once the asynchronous information reaches the gateway, it is converted to APPC/LU 6.2, IBM's protocol for peer-to-peer communications. The gateway then establishes a peer communications session between the ACD and the IBM host.

> SNA Gateway translates asynchronous messages into IBM's APPC/LU 6.2 protocol.
>
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The CallCenter ACDs support the Integrated Services Digital Network Primary Rate Interface (PRI), as well as automatic number identification (ANI). PRI divides the capacity of a T-1 trunk into 23 64K bit/sec voice or data channels, and one 64K bit/sec signaling channel.

For example, ANI information

(continued on page 36)

Now that everyone agrees how a computer should work,

Judging by what you see on magazine covers these days, the world now wants what the Macintosh® computer has always had. And, suddenly, the idea that a personal computer should work the way people do has been embraced by virtually every major player.

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The figures don't come from us. They're from a 1990 study conducted by Diagnostic Research, Inc., among Fortune 1000 *MIS managers and business computer users. Call and we'll send you a copy.*

try the only one that actually works that way.

cations developed specifically for Macintosh over the last seven years. And instead of patiently following the long path from yesterday's MS-DOS to Windows in the interim and to OS/2 in the someday, you can make one simple step to Macintosh.

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After all, now that everybody else is trying to sell you a Macintosh, maybe you should buy one.

The power to be your best.™

16M token-ring support added to Sniffer analyzer

By Tom Smith
New Products Editor

MENLO PARK, Calif. — Network General Corp. last week unveiled a new version of its Sniffer Network Analyzer that supports both 4M and 16M bit/sec token-ring networks.

Based on an interface board developed by IBM for analyzing 4M and 16M bit/sec token-ring nets, the 4M and 16M bit/sec Sniffer Network Analyzer replaces the firm's existing 4M bit/sec token-ring product, which was based on an interface board manufactured by 3Com Corp.

The new token-ring Sniffer Network Analyzer provides the same basic functionality as its predecessor, allowing users to perform network diagnostics, performance analysis and monitoring, as well as decode protocols at all seven layers of the Open Systems Interconnection model.

It supports a variety of protocols, including Transmission Control Protocol/Internet Protocol, IBM's Systems Network Architecture, Digital Equipment Corp.'s DECnet and Sun Microsystems, Inc.'s Network File System. In addition to token ring, it supports a range of local-area network types, including Ethernet, Arcnet and Apple Computer, Inc. AppleTalk.

The new version of the Sniffer Network Analyzer supports Trace Tool Present Notification, a protocol unique to IBM LAN Manager. LAN Manager is a diagnostic program that runs under IBM OS/2 Extended Edition.

Generated every 60 seconds by the Sniffer Network Analyzer, the Trace Tool Present Notification frame will let LAN administrators determine if a network is being monitored by another net analyzer, according to Bruce Fram, manager of product marketing for Network General.

The administrator can prohibit other analyzers, including Sniffer Network Analyzers, from joining the token ring, or it can receive notification if another analyzer has been placed on the net.

In addition, the new model of the Sniffer Network Analyzer can continue to capture frames when the token ring is beaconing, or sending out packets, to determine how a cable break or net adapter failure occurred. When the network is beaconing, new nodes cannot be added to the net.

By capturing beaconing packets, the new Sniffer Network Analyzer can help isolate the problem.

Users have several options for purchasing the new Sniffer Network Analyzer.

An interface board and software can be purchased for an existing Compaq Computer Corp. Portable 386 for $12,500. For $24,000, users can purchase the Series 500, which is the Compaq bundled with the Sniffer Network Analyzer hardware and software. Another Series 500 option is to buy the hardware and software bundled with a Toshiba America, Inc. T3200SX for $16,750.

Network General last week also announced, for the first time, a Sniffer Network Analyzer based on the IBM Personal System/2 Model 70 supporting IBM's Micro Channel Architecture. This model, the Series 700, costs $18,750.

Current users of the 4M bit/sec token-ring Sniffer Network Analyzer can upgrade their hardware and software for $5,000.

All versions are available now.

Network General can be reached in writing at 4200 Bohannon Drive, Menlo Park, Calif. 94025, or by calling (415) 688-2700.

> The new version of the Sniffer Network Analyzer supports Trace Tool Present Notification.
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LAN file mgmt. pack gets upgrade

By Tom Smith
New Products Editor

PHOENIX — Wang Informatics Legal & Professional Systems, Inc., a wholly owned subsidiary of Wang Laboratories, Inc., last week announced a renamed and enhanced version of its software for accessing and managing documents on a local-area network.

The new package, dubbed ProFound 2.0, which will replace Palette 1.2, is compatible with the IBM Systems Application Architecture Common User Access (CUA) interface. The CUA-compatible interface and its pull-down menus replaces Palette's interface, which required users to issue all commands using function keys.

The software is intended for users, such as attorneys, accountants and consultants, who have sensitive documents to manage.

ProFound 2.0, which runs on LAN servers and each node of the network, can work with DOS-based LAN operating systems including Novell, Inc.'s NetWare, Banyan Systems, Inc.'s VINES and 3Com Corp.'s 3+Open. It can manage and provide access to documents created under any DOS application such as word processing, Lotus Development Corp. 1-2-3 spreadsheets and images created under Wang Laboratories Open/image Windows.

ProFound 2.0 increases from 22 to 30 the number of descriptive fields on "catalog cards" created for each document being tracked. It also offers a split screen to accommodate the new fields, which include the date created, the last user to access a document and number of revisions.

ProFound 2.0 also offers a high level of integration with WordPerfect Corp.'s WordPerfect word processing package. Users can now fill out catalog cards while working in a WordPerfect document; before, they needed to exit WordPerfect to do so.

> The software is intended for users who have sensitive documents to manage.
>
> ▲▲▲

ProFound 2.0, like its predecessor, can manage as many as 700 million files on up to 26 LAN servers.

The software is available now. It costs $995 for a version that supports a single server and five users. It costs $249 for each additional user. Each node requires 8K bytes of memory.

For more information, contact Wang Informatics Legal & Professional Systems, 2111 E. Highland Ave., Suite 400, Phoenix, Ariz.; (602) 224-0855.

Software links ACD to SNA

continued from page 33

can be matched with an IBM host data base running under CICS. Based on an ANI match with information stored in the data base, the IBM host can direct CallCenter to route the call to a specific group of agents. CallCenter then selects the next available agent and notifies the IBM host so the telephone call and data arrive on-screen simultaneously.

In order to run integrated voice/data applications in the IBM environment, users need to develop application software for inbound and outbound call routing applications on the CallCenter ACDs.

Aspect provides an implementation guide for writing host applications that communicate with its Application Bridge via APPC/LU 6.2. Aspect also announced an Application Partnership Program, under which it will encourage third-party vendors to develop such applications by providing them with the implementation guide and a CallCenter ACD for testing their software, as well as training and support.

SNA Gateway is available 60 days after receipt of order. The software, which runs on a dedicated PS/2 Model 55 SX, Model 70 or Model 80, costs $10,000.

Aspect can be reached by writing to 1730 Fox Drive, San Jose, Calif. 95131, or by calling (408) 441-2200.

Contel VSATs offer alternative

continued from page 33

casts data to the Contel ASC satellite using C-band frequencies, which are 4 GHz on the uplink and 6 GHz for the downlink.

Other VSAT services broadcast data to a satellite using Ku-band frequencies, which transmit data at 11 GHz on the uplink and 14 GHz on the downlink.

Because VSATs supporting Ku-band frequencies are based on newer technology, they are more expensive than C-band VSATs, according to Salvatore Benti, Contel ASC's vice-president of marketing and sales. Therefore, replacing multidrop analog leased lines with Ku-band VSATs is often not cost-effective.

Ku band also uses a time-division multiple access (TDMA) method to broadcast data to a satellite, while Contel ASC's C-band VSATs use code-division multiple access (CDMA). TDMA requires each VSAT to transmit data within a narrow slice of the Ku-band frequency, while CDMA broadcasts data across the entire bandwidth. This means weather that disturbs a certain frequency can adversely affect a TDMA signal broadcast on a Ku-band channel, Benti said. CDMA sidesteps this problem because data is being broadcast across all C-band channels.

For more information, contact Contel ASC at 1801 Research Blvd., Rockville, Md. 20850, or call (301) 251-4413.

First Look

continued from page 33

signed for Stratus Computer, Inc.'s XA2000.

XCOM 6.2 will enable XA-2000s to exchange files with other systems also supporting XCOM 6.2 software, which supports IBM's Advanced Program-to-Program Communications LU 6.2 protocol.

This allows XA2000s to communicate as peers with a series of other systems, including IBM hosts.

Current versions of XCOM 6.2 run on IBM mainframes under MVS and VM; IBM System/3X and Application System/400 minicomputers; DOS- and OS/2-based microcomputers; Digital Equipment Corp. VAXes under MVS; Apollo Division of Hewlett-Packard Co. and Sun Microsystems, Inc. workstations; and Apple Computer, Inc. Macintoshes.

XCOM 6.2 for the XA2000 will be marketed by Spectrum Concepts and Stratus.

License fees for the product range in price from $6,000 to $16,000.

Spectrum Concepts, Inc., 150 Broadway, Suite 814, New York, N.Y. 10038; (212) 766-4400.

US Sprint unveils switch

continued from page 33

Software that enables the TP4900 switches to support frame relay is also expected in the third quarter and will cost around $20,000 per switch.

In addition, the carrier expects to deliver Integrated Services Digital Network Primary Rate Interface (PRI) software for the T-1 card in the fourth quarter of this year. Company officials said that initially the ISDN software will only support PRI links to US Sprint's network. They declined to release pricing details.

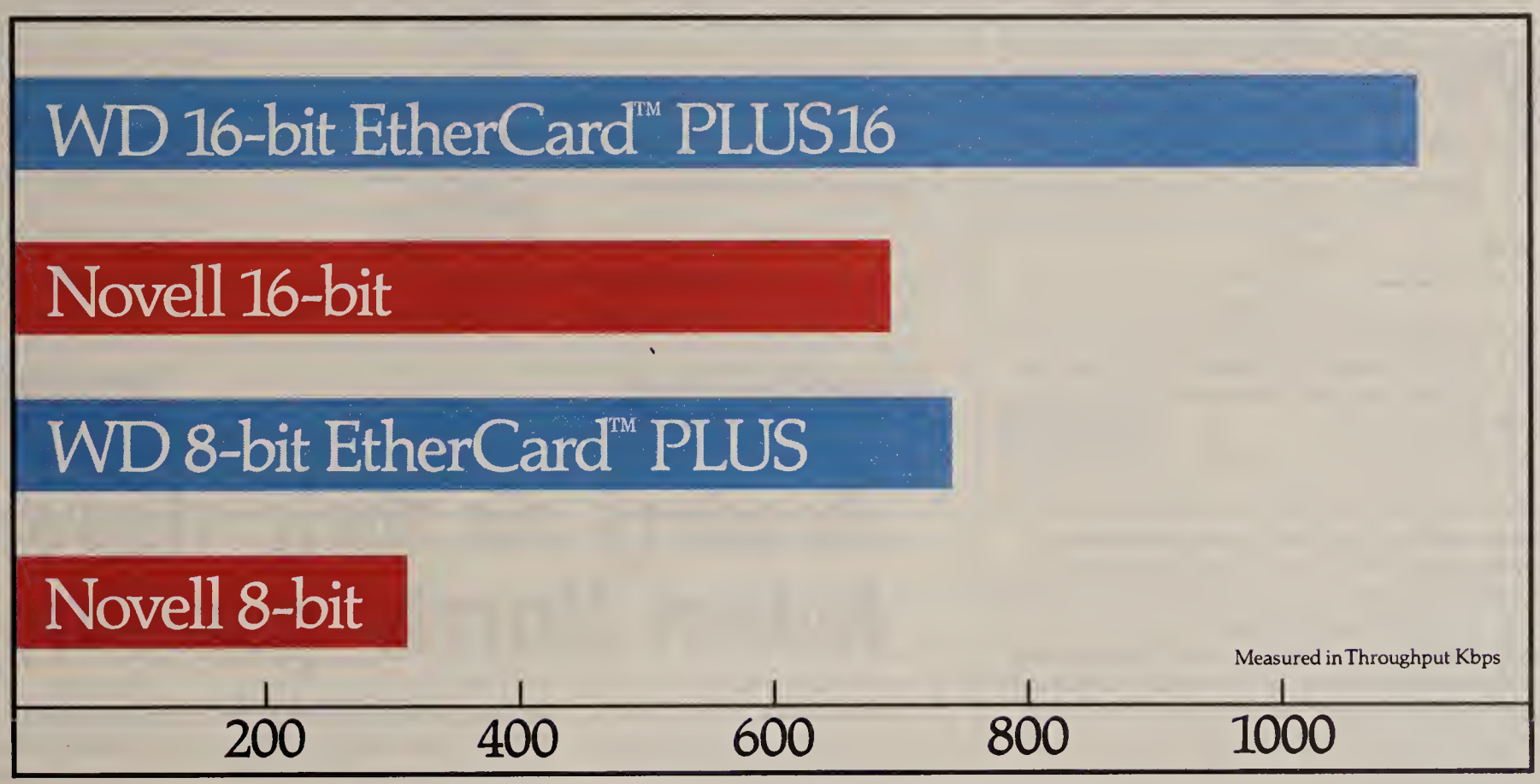
US Sprint also said users can now obtain switched access to its Sprint 56 switched 56K bit/sec service from local carriers in more than 100 U.S. cities.

When US Sprint announced the service last year, it only offered switched access through local carriers in a handful of cities in the BellSouth Corp. territory, according to Glenn Hall, group manager of application support for the carrier. Since then, Hall said US Sprint has added Pacific Bell, New York Telephone Co. and Ameritech to the list of local carriers with which it supports switched access to Sprint 56.

Hall said US Sprint originally declined to support switched access to Sprint 56 from some local carriers because they tacked on surcharges totaling as much as 24 cents per minute above the cost of standard analog switched services to originate and terminate transmissions. Hall said US Sprint opposed this practice.

Over the past year, Hall said many local carriers have begun dropping the surcharge, which has made it possible for US Sprint to work with them.

Our competitors aren't dumb. They're just slow.



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See The FAXNet Form on Page #68

OPINIONS

USER STRATEGIES

BY DEAN WOLF

Outsourcing: Everything old is new again

Wide ties, miniskirts and outsourcing are all fashions that we've seen before. However, the current flurry of trade press activity makes outsourcing seem somehow new and original. Most of what is labeled "outsourcing" has been around for a decade or more. The most significant difference between today's outsourcing offerings and those initially available is not the services, but the business justifications for outsourcing.

Running applications on someone else's computers used to be called "time-sharing." Buying staff resources to operate existing systems and networks is the familiar concept of facilities management. And having a third party design and implement ways to interconnect and streamline the operation and management of disparate systems is essentially systems integration. The only genuinely new services under the outsourcing umbrella are network related. Integration of local-area network-based systems using an outside vendor is a relatively recent offering. Management of voice and data networks is also a new outsourcing service.

> The only genuinely new services under the outsourcing umbrella are network related.
>
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The reason for the recent rise in outsourcing, a market expected to grow to approximately $6 billion by 1994, can be traced to changes in the distribution of people costs for data processing and networking, and to fundamental shifts in the management focus of businesses.

During the 1970s and early '80s, the high cost of hardware made time-sharing an attractive solution to the problem of how best to buy processing power. But the growth of minicomputer- and microcomputer-based application systems changed the value of the hardware portion of the MIS cost equation.

Now the critical cost component is not hardware; it's people. As more companies automate and integrate more applications, the cost of finding and keeping experienced staff, particularly those skilled in telecommunications and data base administration, has become a major concern for businesses. Additional difficulties may result when a company shifts from running applications on mainframes connected to conventional wide-area networks to a client/server environment with bridged LANs. Current staff may not have the skills needed to support the new processing and network architecture.

The value of outsourcing firms is two-pronged. First, because outsourcing firms have a skilled staff available, they can address problems quickly.

Second, because outsourcing firms provide service using less staff than a company would require if that service were performed in-house, the company saves money.

In addition to becoming more cost-conscious, many companies are focusing their management energies on the fundamental nature of their businesses. The argument runs, "We're in the widget business, not in the MIS or networking business. Let's get third-party MIS and network people to perform these functions for us."

Although an outsourcing vendor may be able to offer some cost savings over those that can be reaped from a thorough internal cost restructuring program, the expense and impact of managing the activities of the outsourcing vendor must also be considered. The decision to turn over the operation of the facilities that process and distribute a company's information resources must be made for solid business reasons. ◻

Wolf is a manager with Ernst & Young's Network Strategies practice, located in Fairfax, Va.

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EDITORIAL

Readers air their views on Robert Morris' punishment

A few weeks ago, we asked for your opinions regarding the sentencing of Robert Morris, who generated a worm program that knocked out computers across the Internet in November 1988 ("Robert Morris: Does the punishment fit the crime?," *NW,* May 14).

Morris, who faced a maximum penalty of five years in jail and a $250,000 fine, was sentenced last month to three years' probation, a $10,000 fine and 400 hours of community service for violating the 1986 federal Computer Fraud and Abuse Act.

Since our original editorial, we've received replies by way of facsimile, telephone and mail that show a diversity of opinion on the appropriateness of Morris' punishment.

Some readers clearly thought that Morris got off too easily. "A stiffer sentence should have been imposed to send a clear message to all hackers, whether they be privileged intellectuals or mischievous children," wrote Carl Peeters, with Clark Information Technologies in South Bend, Ind.

C. Denver Mullican, vice-president of Metairie, La.-based Carl Mullican Communications, Inc., added, "If Morris had ridden across America tying people to chairs and making them unable to work for days, many would be calling for the death penalty. That's just what he did; by damaging the network, he tied thousands [of people] to their chairs and deprived them of their personal, business and civil rights.

"The proper punishment would be [for Morris] to serve 1% of the time loss he caused to others. According to some estimates, this would make him eligible for parole in the year 3210," Mullican said.

Frederick Miller, president of Somerset Business Services in Glen Ellyn, Ill., agreed that Morris should spend some time in jail. "[That] would make an indelible mark on him and send a message to other potential violators of the computer security law that the penalty does include time in jail," he said.

But not everyone thought that a jail sentence was an appropriate punishment.

Jail not a deterrent

Alan Nelson, a computer analyst with the state of New York's Audit Department, called to say that jail would not have served as a deterrent to other hackers. "Most of these people are young, and they feel invincible. They don't believe anyone can catch them."

Nelson added, "Given that the damage was unintentional, the sentence may have been too harsh. People convicted of violent crimes [and] people who sell dope get off with probation.

"We need jail to punish the

(continued on page 71)

OPINIONS

SALES TACTICS

BY ANNABEL DODD

A countdown of the 10 worst things about vendors

As telephone equipment sales flatten and the economy softens, some vendors have become more aggressive in their sales techniques. However, many of these sales strategies actually damage customer relationships and ultimately harm sales. Some of the ways in which vendors alienate customers include:

■ **Finger pointing.** Some vendors try to pin the blame on another vendor before testing to determine where the problem lies.

One such situation occurred when a user called a long-distance carrier to report a downed 56K bit/sec data line. A carrier representative called him back to say that they had looped back to his channel service unit (CSU) and saw no problem; therefore, they thought his equipment was bad. The user said he had already checked his equipment and ascertained that it was not faulty.

Once again, the carrier claimed it had a solid loop and the problem was with the user's equipment. The user asked the representative to hold and grabbed the four wires connecting his CSU to the carrier's network and ripped them off the 66 block. He then asked the carrier representative if he still had a solid loop. The answer was yes.

The user told him that he had ripped the wires off the wall and they were, in fact, in his hand.

After a pause, the carrier's representative responded, "I wonder who I am looped to."

The user said, "I don't know, but I'm sure they're not happy!"

Within an hour, the line was back up with no explanation.

■ **Bait and switch.** The vendor lures customers in with one product and then sells them a different one. In one situation, a vendor took one customer's representatives to another user's site to show them a telephone system. The vendor then sold the company a smaller system with inadequate capacity.

When the client company subsequently outgrew the private branch exchange and had to upgrade, the vendor that had used the bait-and-switch technique did not get the new sale.

■ **Going over the contact's head.** Vendors resort to this method when they feel they're losing the deal. Everyone ends up angry, and the vendor always loses the sale.

■ **Late and incomplete information.** In one situation, a user's request for updated pricing information for increased capacity on an item in a request for proposal elicited virtually no response from the vendor.

> After a pause, the carrier's representative responded, "I wonder who I am looped to."
>
> ▲▲▲

Although the vendor subsequently called corporate headquarters concerned about how this issue might affect their bid, they never sent the requested pricing information.

■ **Lies.** An independent vendor of voice mail systems claimed that one of its systems could support three telephone systems on an integrated, "seamless" basis. When a potential customer asked for references from customers that were using the voice mail in this way, the vendor changed its mind on how the system worked and said it could not supply the references.

■ **Unnecessary upgrades.** Some vendors suggest an upgrade as a panacea to solve any and all problems with their equipment. More often than not, user problems can be corrected by proper repair procedures rather than costly upgrades.

■ **Talking down to customers.** In one instance, a potential customer wanted to know if the telephone system a vendor proposed could handle the number of calls her company needed to process. Instead of committing to handling that amount of traffic, the saleswoman gave a long complex explanation of how calls were processed when a simple yes or no would have sufficed. This salesperson lost the sale because the customer sensed a lack of communication.

■ **Too big a cast of characters.** Users who must deal with a number of their vendor's representatives may become confused about who handles what.

■ **Salespeople that lack concrete product knowledge.** Lack of substantial product knowledge among salespeople is a serious impediment to closing sales. Many users try to avoid this situation by bypassing salespeople and going directly to vendors' technical staffs.

■ **Knocking the competition.** Putting down other vendors creates an unfavorable impression of the company doing the criticism. Successful salespeople stress the key advantages of their own products and services rather than knocking the competition. Users can then make purchasing decisions based on confidence in the vendor's product, not on the weakness of the competition.

Poor sales tactics create bad feelings among potential customers, delay buying decisions and ultimately harm both the vendor and the customer. Knowledgeable, honest vendors lend credence to proposals and make it easier for buyers to make good decisions. Buyers need access to pricing, feature and capacity information. They also appreciate dealing with a consistent cast of characters who can support the equipment they have bought and who will be available to support future equipment and service sales.

Dodd, a principal at Dodd Consulting, a telecommunications consulting firm in Framingham, Mass., teaches in the State-of-the-Art Program at Northeastern University in Boston.

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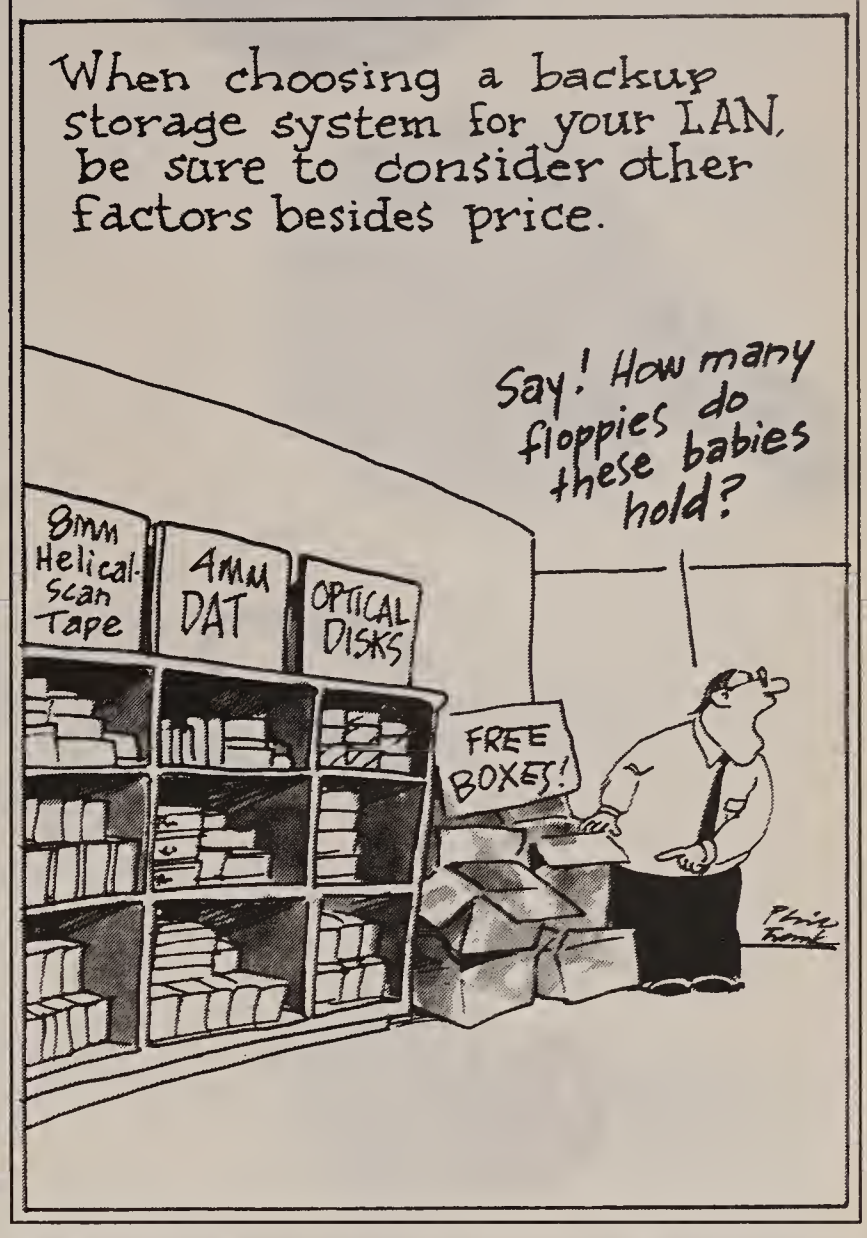
TELETOONS

BY FRANK AND TROISE



LETTERS

Telepoint update

Your recent article on the capabilities of Telepoint service in the U.K. contained some inaccuracies ("European countries give nod to portable telephone," *NW,* April 23).

Telepoint was originally only an outgoing service. However, at least one of the three consortia offering Telepoint now enables subscribers to receive incoming calls as well. For example, users can signal their nearest Telepoint base station. Calls are forwarded as long as the user does not move more than 100 yards from that base station.

The service, not the handset, is called Telepoint, and it did not commence earlier this year but last summer.

Mel Mandell
Free-lance writer
New York

Apples and oranges

Your article "Slow market ripe for T-1 mux deals" (*NW,* May 14) accurately depicts how the maturing T-1 multiplexer market has led to increased price competition. But, unfortunately, a critical point was omitted.

The market projections attributed to Vertical Systems Group do not represent the entire T-1 multiplexer industry. The figures show only one of two U.S. segments.

Vertical Systems' 1989 T-1 industry report projected a five-year compound annual growth rate of 15% for the U.S. T-1 multiplexer market, growing from $338 million in 1988 to $679 million in 1993. These market demand figures include both sales of private network equipment to end users and equipment sold to carriers for support of central office-based intelligent transport services.

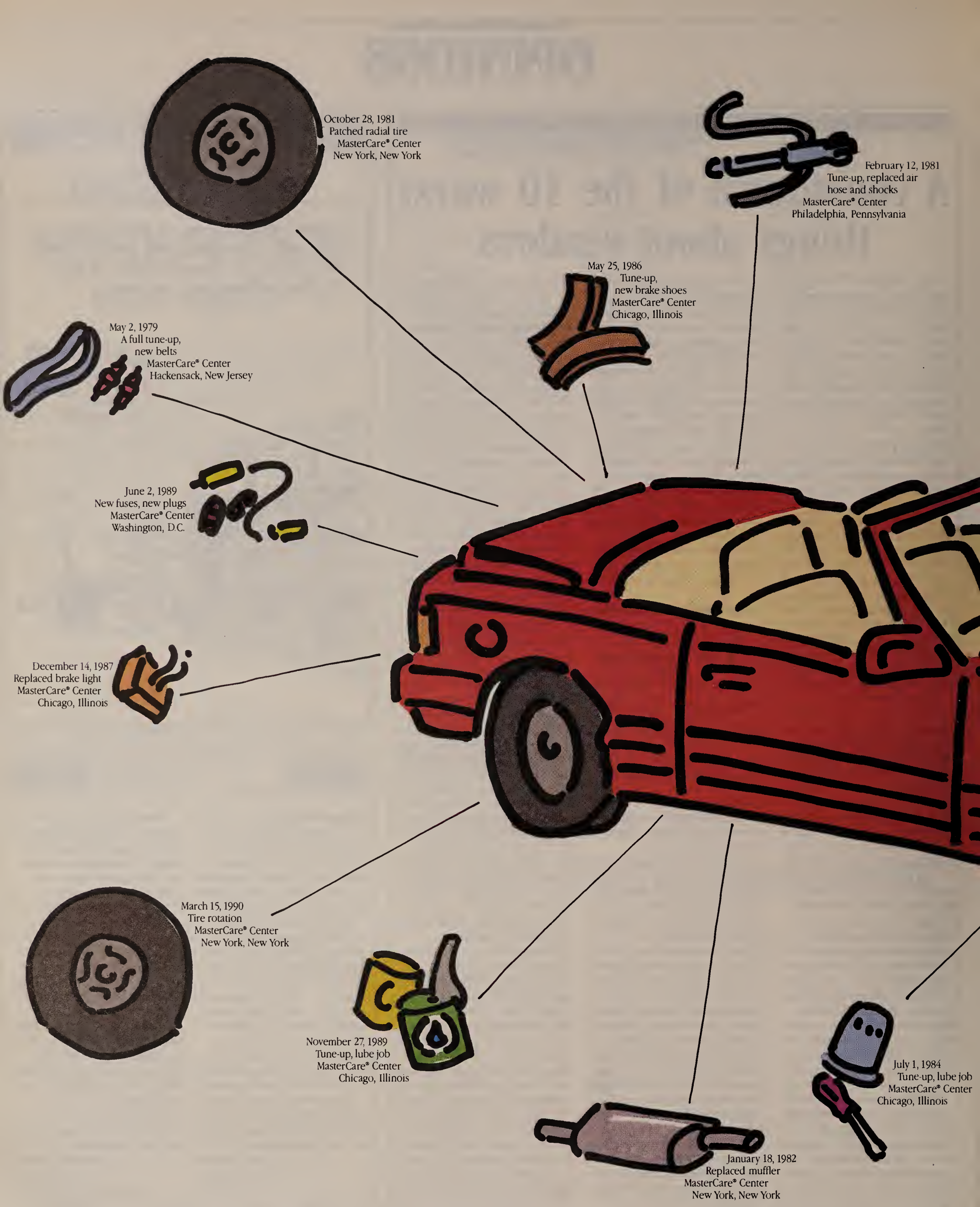
The figures used by *Network World* show only direct end-user purchases.

Rosemary Cochran
Principal
Vertical Systems Group
Dedham, Mass.

Network World *welcomes letters from its readers.*

Letters should be sent to Editor, Network World, *161 Worcester Road, Box 9172, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.



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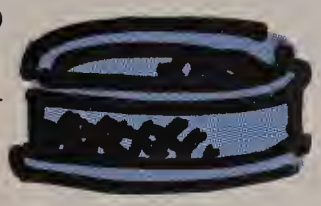
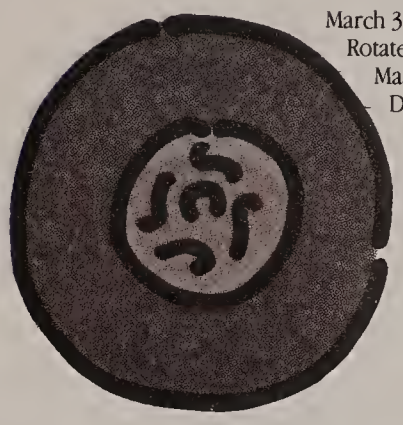
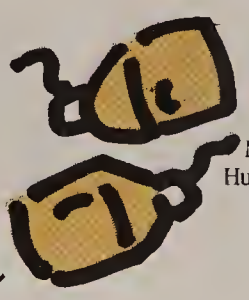
MasterCare® Center
Chicago, Illinois



April 20, 1980
Lube job,
new filter
MasterCare® Center
Hackensack,
New Jersey



March 3, 1987
Rotated all four tires
MasterCare® Center
Dallas, Texas



June 17, 1983
Replaced
broken headlight
MasterCare® Center
Humble, Texas

January 30, 1986
Replaced alternator
MasterCare® Center
Detroit, Michigan

March 2, 1983
Tune-up, lube job
MasterCare® Center
Philadelphia,
Pennsylvania

September 30, 1980
Realignment,
left front tire
replaced
MasterCare® Center
Boise, Idaho

February 13, 1988
New shocks
MasterCare® Center
Detroit, Michigan

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details, call 1 800 247-1212, Ext. 594. In Canada: 1 800 387-6100.

AT&T
Computer Systems

Unable to complete your ISDN call?

CONTINUED FROM PAGE 1

tions by Bell Communications Research (Figure 1, page 46).

According to phone company researchers and both switch vendors, these standardized features will enable basic call setup and teardown of Basic Rate Interface (BRI) ISDN links that traverse both vendors' switches. But the vast majority of features available to customers on one type of switch are not available to users served by the other. For just one example, the User Directory and Message Service provided on AT&T's 5ESS is not available to Northern Telecom DMS-100 users.

■ Major software overhauls in the form of new releases of the switches' generic software loads are appearing with increasing frequency. Third-party makers of BRI phone sets and terminal adapters are frantically trying to keep up with the divergent implementation designs and feature sets of the AT&T and Northern Telecom switches. Each new release brings significant changes that effectively obsolete products tested for compatibility with the previous version.

■ As much as one-third of the cost of ISDN BRI phone sets and terminal adapters is attributable to vendor development efforts required to maintain compatibility with AT&T's and Northern Telecom's variant ISDN implementations.

Mier is president of Mier Communications, Inc., a network consultancy based in Princeton Junction, N.J. Mier Communications publishes the "Mier's Connections" series of computer networking guides.

Differences between AT&T and Northern Telecom ISDN-compatible switches cause user woes.

Most BRI phone set manufacturers have begun using changeable read-only memory packs and erasable programmable ROM (EPROM) designs to reduce the impact of frequent software changes required to maintain current compatibility.

But even so, the divergent ISDN implementations are so rapid and broad in scope that future ISDN BRI customer premises equipment may no longer be user-reconfigurable for either central office switch environment. This means that users will not be able to buy switch-hitting third-party customer premises equipment that can be configured to work with either AT&T or Northern Telecom switches; instead, they will have to buy specialized customer premises equipment for use with each switch type.

■ Due to rudimentary differences in D-channel signaling, as well as widely divergent features, Northern Telecom's own BRI phone sets do not work on an AT&T 5ESS switch. And AT&T's phone sets do not work at all on a Northern Telecom DMS switch.

What's more, in an effort to maintain backward compatibility, Northern Telecom now has to support two radically different generations of BRI phone sets, the older of which is largely obsolete. This duality affects users' ability to move station equipment readily from one BRI line to another, even within the same location.

■ On the data side, at least four incompatible rate-adaption techniques have proliferated: the digital multiplexed interface, Mode Two, a proprietary method championed by AT&T; T-Link, an incompatible

(continued on page 46)

My network in marketing won't share

Now what?

The latest directive from senior management is a doozy. Marketing and manufacturing must now share applications. As for all those different PCs and systems in place, management is "confident you can meet that challenge without incurring significant additional capital expense."

Now what?

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with the network in manufacturing.

HP or Bull host. What's more, 3+Open systems are compatible with DOS, OS/2, UNIX and Macintosh applications.

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to more types of systems.™

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(continued from page 42)
proprietary method pushed by Northern Telecom; and CCITT Recommendations V.110 and V.120, two other quasi-standard techniques.

But different vendors' ISDN terminal adapters can't communicate if different techniques are used. What's more, a Northern Telecom implementation quirk currently prevents a device at one end of a circuit from identifying and adapting to any different method used by the device at the other end. As a result, any incompatibility between customer terminal adapters over an ISDN connection results in automatic and immediate connection termination.

ISDN island-hopping

Currently, ISDN BRI communications and features are constrained to the user community "island" served by that particular ISDN central office switch, whether AT&T's 5ESS or Northern Telecom's DMS-100. The success of the next phase of ISDN deployment — bridging these scattered ISDN islands so that users can achieve wide-area ISDN connectivity — is crucial if ISDN is ever to succeed in the U.S. This inevitably means setting up ISDN connections across a mix of Northern Telecom and AT&T ISDN switches.

Erwin Sloan, director of data communications for Woodbury, N.Y.-based Telrad Telecommunications, Inc., says the plug-and-play transportability of ISDN customer premises equipment — always an implied promise of ISDN — is being jeopardized by AT&T's and Northern Telecom's incessant and divergent implementation changes.

Telrad's ISDN BRI phone sets have been checked out against AT&T's current switch software, called 5E5 (see Figure 2). But the release later this year of AT&T's next major revision, 5E6, will necessitate completely new retesting by the dozens of manufacturers that make ISDN BRI gear. "It'll be another EPROM," Sloan says.

On the Northern Telecom side of the equation, Telrad last tested its phone sets with a DMS-100 switch running BCS 29 software. The current Northern Telecom software load is BCS 30; BCS 31 is due out later this year.

Unfortunately, since Telrad last tested for compatibility, Northern Telecom made a radical change in the signaling method used between the switch and the phone set, migrating from the old "stimulus" signaling, designed for phone sets with very limited local processing intelligence, to the newer "functional" signaling method. Telrad hopes to complete testing against the functional signaling of BCS 30 by the end of the year.

Portability

To avoid alienating equipment manufacturers, both AT&T and Northern Telecom have bent over backwards to make sure their latest software versions also support equipment built to their respective previous releases. However, maintaining this backward compatibility for the convenience of third-party customer premises equipment suppliers is beginning to impose a price on end users.

Now, customers signing up for BRI service on a DMS-100 must follow the presubscription procedures of their local phone company. This involves, among other things, specifying which generation of phone sets is to be connected to each ISDN BRI line. The telephone company then fixes the settings at the central office for the mode of operation for each individual BRI line.

AT&T's and Northern Telecom's intentions to maintain backward compatibility should at least save users from having to throw out their customer premises equipment every few years — even if they will not have access to new features in later-generation equipment.

What price compatibility?

The amount of development and resources required to achieve and maintain compatibility between AT&T and Northern Telecom switches is not only draining third-party manufacturers, it also accounts for a significant and growing percentage of the price users pay for switches and other ISDN hardware.

"Prices would begin to plummet if there were one standard," says Ham Mathews, product manager for Oak Brook, Ill.-based Progressive Computing, Inc., which makes the Tel/Adapter, a personal computer plug-in ISDN terminal adapter board.

Most manufacturers peg the price of maintaining compatibility at anywhere from 10% to a full third of their products' cost.

"It's at least 30% of the cost," says Cindi Branham, product marketing manager for ISDN products with Universal Data Systems, Inc. in Huntsville, Ala. "We've had to develop [compatibility with AT&T and Northern Telecom] as two separate functions."

When one switch vendor or the other issues a new release of its generic software load, each equipment maker must then adapt its current product to the new release.

"It's about six man-months of effort to do a switch upgrade," says Ron Aitchison, director of ISDN sales and marketing with ICL Networks Industry's ISDN Systems Group, in Stamford, Conn.

In search of a standard

Most sources agree that basic call setup and teardown compatibility has been proven, at least in lab tests, between AT&T and Northern Telecom switches. Others, however, point out that basic ISDN call establishment in accordance with any standard benchmark is not expected until year end, at the earliest.

Setting up and clearing ISDN calls between different vendors' switches is spelled out in a BELLCORE specification called Technical Reference 268, which AT&T and Northern Telecom have both agreed to implement in their next major software revisions.

Until then, support of features across both switch product lines will likely remain a source of controversy and dispute. According to Aitchison, recent BELLCORE tests in Naperville, Ill., failed to establish that call transfer or conferencing across both switches would work. Northern Telecom disputes this conclusion, however.

According to Jim Collier, Northern Telecom's manager of ISDN product management, the popular telephony features known as the "Big Four" — call hold, call transfer, call drop and call conferencing — *do* work across both switch product lines. This is so, he says, because these features are supported even today over the plain old telephone service analog network.

Collier acknowledges, however, that these features could not have been properly tested yet in an ISDN environment without Signaling System 7 (SS7) links between the two disparate switches. SS7 support will not be available from either company until later this year, when Northern Telecom releases its BSC 31 software and AT&T issues 5E6, its next 5ESS software release.

The vast majority of the features that each switch vendor now offers to BRI customers are of a proprietary design and implementation.

Northern Telecom acknowledges that many of these features have been rushed out so that local telephone companies could offer Centrex-type BRI and compete more effectively against private branch exchanges. Still, standard ISDN features, which are spelled out in BELLCORE's specifications and which Northern Telecom and AT&T pledge to support, represent only a limited subset of the features that both vendors already provide.

BELLCORE's specification, referred to as Phase 1, addresses approximately 70 features, which encompass most of the features and capabilities of current Centrex offerings.

However, Collier claims that his company's switch currently offers approximately 300 features. He adds that at least two more phases of ISDN feature specifications are due from BELLCORE over the next two years and that AT&T and Northern Telecom can only begin to iron out their feature implementation differences after BELLCORE has solidified and published them.

Northern Telecom predicts that, if all goes as scheduled, some convergence of ISDN feature implementations should begin to occur by the end of 1991. At that time, some degree of portability between ISDN customer premises equipment should begin to appear.

Switched data

Unfortunately, even though in the coming years Northern Telecom and AT&T may begin to implement telephony features in a common fashion, the ability of ISDN connections to carry switched data across switch product lines and between different vendors' terminal adapters may not materialize until much later.

The difficulty here is rate adaption, the technique ISDN terminal adapters use to accommodate a less than 64K bit/sec switched data stream within a 64K bit/sec ISDN B channel. Because the type of rate adaption used is largely transparent to the ISDN switch, it has not been a major issue among ISDN standards setters. As a result, at least four different schemes are in wide use among terminal adapter vendors today.

While there are unconfirmed reports that some terminal adapter vendors are privately working on interoperability testing, most agree that interworking between different terminal adapters just isn't possible today. "All that our developers can guarantee is that we can't interoperate with anyone else," quips ICL's Aitchison.

(continued on page 71)

ISDN implementation differences: AT&T vs. Northern Telecom

Figure 1

Difference	Effect on users
Northern Telecom supports two different generations of ISDN Basic Rate Interface phone-set signaling: ■ Older "stimulus" signaling for dumb DMS-compatible phone sets. ■ Newer "functional" signaling for more intelligent DMS phone sets.	■ Phones built to earlier stimulus specification cannot use latest features. ■ BRI customers on a DMS switch must presubscribe, specifying features and phone-set type for each BRI line individually. ■ Phone sets cannot be moved without first presubscribing again with local telco.
Both vendors support different Layer 3, D-channel message formats.	■ BRI phone sets connected via different CO switches (AT&T 5E, Northern Telecom DMS) are limited to basic call setup and teardown. ■ Northern Telecom's DMS-compatible ISDN BRI phone sets do not work on an AT&T 5ESS ISDN CO switch. ■ AT&T's 5ESS-compatible ISDN BRI phone sets reportedly do not work on a DMS ISDN CO switch.
Less than 25% of ISDN BRI telephony features are common to both vendors' ISDN switches.	■ Popular features available to BRI customers on one switch type are not available to the other switch's BRI customers. ■ "Networked" ISDN features can't be used across links that traverse AT&T and Northern Telecom COs until both vendors implement Signaling System 7.
Both vendors offer proprietary standards for data-channel rate adaption; the transfer of end-to-end compatibility information is handled differently.	■ Connecting different vendors' terminal adapters for switched, B-channel, rate-adapted data, is virtually impossible. ■ Switched data calls are automatically terminated whenever incompatibility occurs.
Maintenance and management services are implemented differently.	■ User-based centralized management of an ISDN network, including loop-back testing of discrete links, must address two different operational environments.

GRAPHIC BY SUSAN SLATER SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

ISDN CPE vendors trying to keep up

Figure 2

Vendor	AT&T 5ESS switch compatibility tested*	Northern Telecom DMS-100 compatibility tested**	Rate adaption technique employed
Gandalf Data, Inc.	5E5	Under development	V.110
ICL Networks Industry ISDN Systems Group	5E5 (planning retest on 5E6 in 3Q 1990)	BCS 29	V.120
Newbridge Networks, Inc.	5E5 (planning retest on 5E6 in 3Q 1990)	BCS 30	X.30 (RS-232 & RS-449 links), V.110 (V.35 links)
Progressive Computing, Inc.	5E5 (planning retest on 5E6)	Now working on BCS 29	None currently (under development)
Teleos Communications, Inc.	5E4.2	BCS 25	Subset of V.120
Telrad Telecommunications, Inc.	5E4.2	BCS 29	Proprietary (going to V.110)
Universal Data Systems, Inc.	None currently	BCS 25	T-link (future terminal adapter will support T-link and V.120, manually switchable)

***Current software version is 5E5; 5E6 expected 3Q 1990.**
****Current software is BCS 30; BCS 31 expected 3Q 1990.**
This chart represents only a sampling of suppliers of ISDN BRI customer premises equipment (ISDN phone sets and/or terminal adapters).

GRAPHIC BY SUSAN SLATER SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

LAN DBMS SOFTWARE

A platform for the future

By JAMES KOBIELUS

Local-area networks are finally gaining respect as platforms for high-performance computing, thanks in part to recent advances in LAN-based data base management system software.

DBMS software products for LANs are rapidly becoming more sophisticated, rivaling mainframe and minicomputer data base systems in areas where the latter have long been hands-down favorites. These areas include security, reliability, data integrity and performance.

Many DBMS software vendors are adopting the data base server architecture for their LAN-based offerings. Close to half of the products featured in the chart beginning on page 50 fall into this category. Data base servers boast a considerable performance advantage over the older LAN DBMS technology, the file server architecture.

A data base server — such as SQL Server from the Ashton-Tate Corp./Microsoft Corp./Sybase, Inc. alliance or Novell, Inc.'s NetWare SQL — minimizes LAN traffic by transmitting only those records a user requests.

In contrast, the file server configuration of a LAN DBMS — such as Ashton-Tate's dBase III Plus LAN Pack or Fox Software, Inc.'s FoxBase Plus/LAN Version — responds to a user query by sending the entire data base file to be processed at the client workstation.

This latter arrangement can eat up precious LAN bandwidth, especially when the data base files transmitted contain thousands of records or are requested concurrently by many users.

Choosing the right LAN DBMS software package is not an exercise for the faint of heart. Application architecture — data base

(continued on page 53)

Kobielus, a contributing editor to Network World, *is a consultant based in Alexandria, Va.*

LAN data base management systems will play an important role in the communications strategies of the 1990s.

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Local-area network DBMS products

Vendor	Product	Hardware	Operating systems	Networks	Application architecture/ data base structure	Security	Recovery	Concurrency control	Data integrity	Application development tools	File import/ export	SQL-compatible?	Base price
Acius, Inc. Cupertino, Calif. (408) 252-4444	Fourth Dimension	Apple Computer, Inc. Macintosh family	Macintosh	NetWare, Ethernet, 3Com Corp. 3Plus, HFS, AFP, interfaces to minicomputer- and mainframe-based Ingres, Sybase, RDB, Oracle, Informix, Datatrieve (on Digital Equipment Corp.), DB2 and SQLDS DBMSs	File server/ relational	Password protection	NA	Record locking	NA	Fourth-generation language with application, report, screen and menu builders; third-generation language support for C and Pascal	Text, DIF, SYLK, ASCII	Yes	NA
Aker Corp. Irvine, Calif. (800) 345-6244	Magic PC Version 3.0	IBM PC XT, AT, PS/2	MS-DOS 3.1 or later	NetWare, IBM PC LAN	File server/ relational	Password protection, access controls	Pre-imaging	File and record locking	NA	Fourth-generation language with screen, report and forms builders; data dictionary; run-time version of Novell's Btrieve file manager included in package	ASCII	No	$799
Alpha Software Corp. Burlington, Mass. (617) 229-2924	Alpha Four	IBM PC XT, AT, PS/2	DOS 2.0 or later	LAN	File server/ relational	Password protection	NA	NA	NA	Fourth-generation language with menu, forms and report builders	dBase II, dBase III Plus, dBase IV, Alpha II, Lotus Development Corp. 1-2-3, Symphony, SYLK, DIF, PFS:File, ASCII, Multimate (export only), WordPerfect (export only)	No	$549
Ashton-Tate Corp. Torrance, Calif. (213) 329-8000	Ashton-Tate/ Microsoft SQL Server	IBM PC AT, PS/2	OS/2, DOS	LAN Manager, TCP/IP, DECnet	Data base server, distributed data base/ relational	Password protection, access controls	Automatic backup at check-points, transaction logging, two-phase commit, rollback, roll-forward	Page, table and record locking; deadlock detection and elimination	Triggers, stored procedures, defaults, server-enforced business rules	Proprietary fourth-generation language Transact-SQL; third-generation language support for C; supports dBase, PC/Focus, Paradox, Clipper and DataEase as front-end development tools; data dictionary	NA	Yes, with extensions	$2,495
	dBase III Plus LAN Pack	IBM PC, XT, AT, PS/2	DOS	IBM PC LAN, NetWare, 3Com, IBM Token-Ring, AT&T Starlan, Ungermann-Bass, Inc.	File server/ relational	Password protection, data encryption	Recovery	File and record locking	NA	Fourth-generation language with menu, report, application, query and screen builders; run-time version	PFS:File, 1-2-3, SYLK, DIF, ASCII	No	NA
	dBase IV Version 1.0, LAN Pack and Developers' Edition	IBM PC, XT, AT, PS/2	DOS 3.1 to 3.31 for multiuser LANs	3Com, Banyan Systems, Inc., IBM PC LAN, NetWare, NETBIOS, Ungermann-Bass; front end to SQL Server; interfaces to mainframe and minicomputer DBMSs	File server/ relational	Password protection, access controls, data encryption	Rollback, transaction logging, incremental backup	File and record locking; automatic screen refresh on update	NA	Fourth-generation language with menu, screen and report builders; built-in automatic compiler	ASCII, dBase II, dBase III Plus, DIF, Framework, 1-2-3, RapidFile, SYLK, WKS, PFS:File	Yes, with extensions	$995
Borland International, Inc. Scotts Valley, Calif. (408) 438-8400	Paradox 3.1 and LAN Pack	IBM PC, XT, AT, PS/2	DOS 2.0 or later	NetWare, 3Com, IBM PC LAN, Torus Tapestry, Starlan, Banyan, LAN Manager; front end to IBM's OS/2 Extended Edition Database Manager, Ashton-Tate/Microsoft SQL Server and Oracle Server for OS/2	File server/ relational	Password protection, access controls, data encryption	Auto-save	File, table and record locking; automatic screen refresh; deadlock detection and elimination	Referential integrity	Fourth-generation language with menu, screen, report and application builders	Quattro, Reflex, 1-2-3, Symphony, dBase II, dBase III, dBase III Plus, PFS:File, DIF, ASCII	Yes	$725 for V. 3.1, $995 for LAN Pack
	Paradox 386 Version 2.0	IBM PS/2	DOS 3.0 or later	NetWare, 3Plus, IBM Token-Ring, IBM PC LAN, Torus Tapestry, Starlan, Banyan; front-end interface to IBM's OS/2 Extended Edition Database Manager, Ashton-Tate/Microsoft SQL Server and Oracle Server for OS/2	File server/ relational	Password protection, access controls, data encryption	Auto-save	File, table and record locking; automatic screen refresh; deadlock detection and elimination	Referential integrity	Fourth-generation language with menu, screen, report and application builders	1-2-3, Symphony, dBase II, dBase III, dBase III Plus, PFS:File, DIF, ASCII	Yes	$895
	Paradox OS/2 Version 2.0	IBM PS/2	OS/2 1.0 or later	NetWare, 3Plus, IBM Token-Ring, IBM PC LAN, Torus Tapestry, Starlan, Banyan; front-end interface to IBM's OS/2 Extended Edition Database Manager, Ashton-Tate/Microsoft SQL Server and Oracle Server for OS/2	File server/ relational	NA	Auto-save	File and record locking	NA	Fourth-generation language with menu, screen, report and application builders	1-2-3, Symphony, dBase II, dBase III, dBase III Plus, PFS:File, DIF, ASCII	Yes	$725
Caltex Software, Inc. Dallas (214) 522-9840	D the Data Language 2.7.6	IBM PC, XT, AT, PS/2	DOS 2.0 or later, Xenix, Unix	NetWare	File server/ relational	Data encryption	Continuous check-points	NA	NA	Fourth-generation language with menu, screen and report builders	NA	No	$395
Clarion Software, Inc. Pompano Beach, Fla. (800) 354-5444	Clarion Professional Developer Version 2.1	IBM PC, XT, AT, PS/2	DOS 2.1 or later	NetWare, IBM PC LAN, 3Com, Banyan	File server/ relational	Password protection, data encryption	NA	File and record locking; automatic screen refresh; deadlock detection and elimination	NA	Fourth-generation language with screen, application and report builders; third-generation language support for C and Assembler	NA	No	$845
DataEase International, Inc. Trumbull, Conn. (800) 243-5123	DataEase Version 4.2	IBM PC, XT, AT, PS/2	MS-DOS 3.1 or later	NetWare, Banyan, IBM PC LAN, 3Com EtherSeries and 3Plus, Starlan	File server/ relational	Password protection, access controls, data encryption	NA	Data base, file and record locking with user conflict messaging; automatic screen refresh	Referential integrity	Proprietary programming language; run-time version; converts applications from 1-2-3, dBase, Symphony and Paradox; multimedia data base support	ASCII, 1-2-3, dBase, Paradox, MultiMate, WordPerfect	No	$700

This chart includes a representative selection of vendors in the local-area network data base management system market. Vendors may offer other local net DBMSs, and vendors not included may offer a full range of competitive products.

SOURCE: JAMES KOBIELUS, ALEXANDRIA, VA.

Local-area network DBMS products (continued on page 58)

Vendor	Product	Hardware	Operating systems	Networks	Application architecture/ data base structure	Security	Recovery	Concurrency control	Data integrity	Application development tools	File import/ export	SQL-compatible?	Base price
Empress Software, Inc. Greenbelt, Md. (301) 220-1919	Empress and Empress 4GL	Apollo Division of Hewlett-Packard Co., Sun Microsystems, Inc., DEC, Intel Corp., Unisys Corp., Silicon Graphics, Inc. and others	DOS, Unix, VMS	VAXcluster, Apollo Ring, DECnet, NFS, RFS	Data base server, distributed data base/ relational	Password protection, access controls	Two-phase commit, journaling, rollback, roll-forward, transaction logging, check-points	Table, group and record locking	Referential integrity, range checks	Fourth-generation language with application, menu, screen and report builders; third-generation language support for C and Fortran; multimedia data base support	ASCII	Yes, with extensions	$1,250
Fox Software, Inc. Perrysburg, Ohio (419) 874-0162	FoxPro/ LAN Version 1.0	IBM PC	DOS 2.0 or later	NETBIOS	File server/ relational	NA	NA	File and record locking	NA	Fourth-generation language with menu, screen, report and application builders; integrated compiler; royalty-free run-time license; user-defined functions	dBase IV, dBase III Plus, FoxBASE Plus	No	$1,095
	FoxBase Plus/LAN Version 2.10	IBM PC	DOS 3.1 or later	NETBIOS	File server/ relational	NA	NA	File and record locking	NA	Fourth-generation language with menu, screen and application builders; integrated compiler; royalty-free run-time license; program documenter; user-defined functions	dBase III Plus	No	$595
GUPTA Technologies, Inc. Menlo Park, Calif. (415) 321-9500	SQLBase Version 4.0	IBM PC AT, PS/2; Sun SPARC computers	DOS, Microsoft Windows, OS/2, Unix	NetWare, NETBIOS, IBM PC LAN, Ethernet, 3Plus, Starlan, IBM Token-Ring Network, Arcnet, Named Pipes; gateways to DB2, SQLDS, Oracle Server and OS/2 Extended Edition	Data base server, distributed data base/ relational	NA	Backup, commit, journaling, rollback, roll-forward, transaction logging	Page and record locking; deadlock detection and elimination	Triggers, stored procedures, server-enforced business rules	Microsoft Windows-based fourth-generation language with menu and report builders; third-generation language support for C and COBOL; supports dBase programming language through Clipper and Quicksilver compilers; data dictionary; result-set queries; supports Excel and 1-2-3 spreadsheets as front ends	ASCII, binary, DBS, DIF, Excel, 1-2-3, WKS	Yes, with extensions	$1,995
IBM Armonk, N.Y. (800) 426-2468	OS/2 Extended Edition Database Manager Version 1.2	IBM PC AT and PS/2	DOS, OS/2	LAN Server, NETBIOS, LU 6.2, X.25, Ethernet, IBM PC LAN, SDLC, IBM Token-Ring	Data base server, distributed data base/ relational	NA	Rollback, transaction logging	Page, table and record locking	Referential integrity	Fourth-generation language with menu and report builders; third-generation language support for C, COBOL, Fortran, Pascal and REXX; supports Borland's Paradox as front end	ASCII, PC/IXF, WFS	Yes, with extensions	$795
Information Builders, Inc. New York (212) 736-4433	PC/FOCUS	IBM PC, XT, AT, PS/2	DOS 2.1 or later, OS/2	3Com, Banyan, IBM PC LAN, NetWare, Ungermann-Bass; front-end interface to Ashton-Tate/Microsoft SQL Server	File server, data base server, distributed data base/ relational	Password protection, access controls, data encryption	Rollback, roll-forward, transaction logging	NA	NA	Fourth-generation language with application, menu, screen, report and window builders; third-generation language support for C, Assembler, Basic, Focus, Fortran, Ada and Pascal; data dictionary; run-time version	ASCII, dBase, DIF, 1-2-3, Symphony, WordStar	Yes, with extensions	$1,295
Information Resources, Inc. Waltham, Mass. (617) 890-1100	pcEX-PRESS 2.0	IBM PC, XT, AT, PS/2	DOS 3.0 or later	Synchronous (3270) and asynchronous communication; front-end interface to EXPRESS/EXPRESS MDB, SQL and other DBMSs	File server/ relational	Password protection	Rollback	Write lock with concurrent read-only access	Referential integrity	Fourth-generation language with menu, form and report builders; active data dictionary	1-2-3, Symphony, DIF, PRN, Data Reader for nonstandard formats (including binary)	Yes	$1,495
Informix Software, Inc. Menlo Park, Calif. (415) 926-6300	Informix On-Line and Informix-Star	Unix-based computers, including HP 9000, Intergraph, Sequent, Sun 3 and 4	Unix, VMS	3Plus, Starlan, IBM PC LAN, NetWare, DECnet, 3270/SDLC, TCP/IP	Data base server, distributed data base/ relational	Password protection, access controls	Disk mirroring, rollback, roll-forward, transaction logging, on-line archive, pre-imaging, after-imaging	Data base, table, page and row locking; deadlock detection and elimination	NA	Fourth-generation language with menu, report, query and application builders; third-generation language support for C, COBOL, Ada and Fortran; ability to call wordprocessing document, graphic, fax, video image or other large data object from within a data base application; multimedia data base support; supports 1-2-3, Wingz and SmartWare II as front ends	ASCII	Yes, with extensions	$1,600
Ingres Corp. Alameda, Calif. (415) 769-1400	Ingres Intelligent Database	IBM PC, XT, AT, RT, PS/2; AT&T 6386, Macintosh II, Compaq Computer Corp., HP 9000, Next, Sun	A/UX, DOS 2.1 or later, HP-UX, Mach, SunOS, Unix, Xenix	Asynchronous, DECnet, TCP/IP, LU 6.2	Data base server, distributed data base/ relational	NA	Disk mirroring, journaling, on-line backup, rollback, roll-forward, transaction logging	NA	Triggers, embedded rules for continuous data base monitoring	Fourth-generation language with form, graph, menu and report builders; third-generation language support	ASCII, DBS, DIF, 1-2-3, proprietary, SYLK, WKS, WordStar	Yes, with extensions	$695

AFP = Apple Filing Protocol
APL = A Programming Language
CUA = Common User Access
DBF = dBase Format
DIF = Data Interface File
DNA = Digital Network Architecture
HFS = Hierarchical File System
HLLAPI = High-Level Language Application Program Interface
IMG = Image file extension
MUMPS = Massachusetts General Hospital Utility Multiprogramming System
NA = Information not available
NFS = Network File System
PCX = Graphics file extension
PRN = Print file extension
REXX = Restructured Executive External Language
RFS = Relational File System
SDF = Standard Data Format
TIFF = Tagged Image File Format
WKS = Worksheet file extension

This chart includes a representative selection of vendors in the local-area network data base management system market. Vendors may offer other local net DBMSs, and vendors not included may offer a full range of competitive products.

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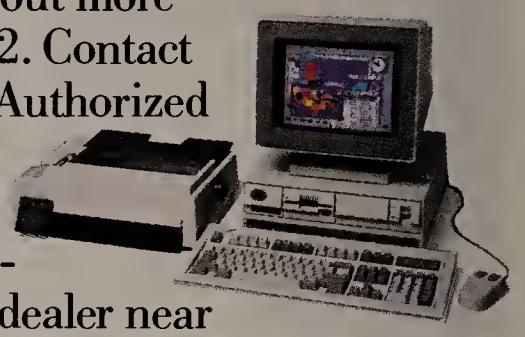

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server vs. file server — is just one of many factors that users must consider. Multiuser LAN DBMS software products are very complex and directly affect many groups within an organization, including end users, software developers, data administrators, hardware buyers and network planners.

To accentuate the burden of choice, dozens of vendors offer sophisticated LAN DBMS packages and new companies are entering the market at an increasing clip.

Meanwhile, LAN DBMSs are taking on greater importance in corporate information systems (IS) and communications strategies. LAN DBMSs are a core technology for the future of distributed processing. They unite the emerging network model — LANs and wide-area networks — with the increasingly dominant client/server application architecture.

LAN DBMSs will no doubt be the platform for many mission-critical business applications in the 1990s and beyond. The technology, straddling the fence between the worlds of IS and telecommunications, will also cause a blurring of the once sharp division between these professional disciplines.

What's a prospective LAN DBMS software buyer to do? Narrowing down the field of LAN DBMS products can be as easy as setting a few priorities, says David Vinzant, president of Vinzant, Inc., a Portage, Ind., data base consultancy and software developer.

"People would be amazed by how quickly they can shorten their list [of suitable LAN DBMS products] by applying a few simple criteria," such as operating and programming environments to be supported, Vinzant says.

He counsels users against selecting a particular LAN DBMS product simply because it was hyped in the press or touted by the techie down the hall.

"What one reviewer dislikes may be just the thing for you," Vinzant says. "For example, Novell's NetWare SQL data base server has taken a lot of flak because it was built on top of Btrieve [an older DBMS system that comes bundled with the NetWare LAN operating system]. However, this can be a positive feature if you have Btrieve applications in that it enables you to use existing Btrieve data files with NetWare SQL."

What should users consider when evaluating LAN DBMS software packages? Most importantly, they should understand their own requirements. Different products must be measured by how well they fit those requirements, not by conformance to the DBMS buzzword of the hour, be it "relational," "SQL," "object-oriented," "multimedia" or another high-tech mantra.

User requirements for LAN DBMS products fall into three general categories: environment, data administration and performance.

The environment

The first order of business when evaluating LAN DBMS products should be to specify the total hardware/software environment within which the DBMS is to work. "It's important to consider whether the LAN DBMS conforms with the established technical standards within one's organization," says Steve Papermaster, president of Business Systems Group, Inc., a systems integration firm in Houston.

Ideally, the LAN DBMS should be able to be implemented with few, if any, modifications to existing systems. One might call this the plug-and-play requirement. There are three types of environments into which the LAN DBMS is to be plugged: operating, development and user.

■ **Operating environment.** This refers to LAN operating systems and protocols with which the DBMS is compatible, as well as the hardware, operating systems, memory and storage requirements of server and client machines.

It also refers to compatible data base file formats such as ASCII, dBase III Plus and raster graphics, as well as data base query mechanisms such as SQL, the de facto standard for accessing and manipulating relational data base systems.

As could be expected, the majority of LAN DBMS products work under Novell's NetWare. The other leading LAN operating systems — 3Com Corp.'s 3+, Banyan Systems, Inc.'s VINES, IBM's PC LAN and AT&T's Starlan — are also well represented. A growing number of LAN DBMSs — most notably, SQL Server — work with LAN Manager, the Microsoft-developed, OS/2-compatible network operating system.

DBMSs built for LAN Manager can also operate in a NetWare environment, as long as a Novell-provided protocol driver, NetWare Requester for OS/2, is installed on the server machine.

Most new LAN DBMSs are built on a relational data base model, which allows for flexible data manipulation in tabular form.

SQL is the standard data retrieval language used by applications to access and update the shared relational data base. The end user rarely sees SQL; more often, SQL statements are embedded within a full-featured programming language, such as C or COBOL, prior to compilation and invoked transparently from within the end application.

Users beware: Although SQL is an ANSI-certified standard, many LAN DBMS vendors have developed proprietary extensions to it. For example, Ashton-Tate/Microsoft's SQL Server comes with a proprietary extension known as Transact-SQL.

SQL extensions usually serve a worthy purpose — namely, to enhance performance, functionality and data base integrity. However, they have the unpleasant side effect of inhibiting application portability and interoperability among DBMS systems. Standards bodies are still wrangling with the problem of how to bridge among different SQL interpretations.

> LAN DBMSs are a core technology for the future of distributed processing.
>
> ▲▲▲

Some LAN DBMS vendors have built proprietary gateways to other vendors' relational DBMS products, particularly those running on mainframe and minicomputer platforms.

For example, GUPTA Technologies, Inc. and Oracle Corp. provide interfaces from their respective data base servers to IBM's DB2 and SQL/DS data base systems. Gateways such as these are important for LAN DBMSs that require some means of linking to mainframes in the corporate data center.

> Ideally, a LAN DBMS should be able to be implemented with few, if any, modifications.
>
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An increasing number of LAN DBMSs are providing distributed data base or multiple server capabilities similar to those long available in mainframe and minicomputer environments. Under a distributed data base architecture, data stored on multiple server machines is accessed through a single query from a client workstation.

The servers, which may be on the same LAN or separated by thousands of miles, keep track of where the data is stored and route the query — or segments of it — to the appropriate locations. The originating server correlates the results of all subsidiary queries and delivers the information to the waiting client, which is oblivious to the chain of events that serviced its request.

Distributed data base capabilities are essential to high-volume, on-line transaction processing (OLTP) functions, traditionally the province of mainframes and minicomputers. Vendors such as the Ashton-Tate/Microsoft/Sybase alliance and GUPTA Technologies are positioning their distributed LAN data base products to serve the OLTP market.

Consequently, they are fighting a never ending "battle of the benchmarks," wherein each side tries to prove that its server is the fastest transaction processor this side of Laredo, Texas.

■ **Development environment.** This refers to the programming languages and tools with which IS personnel develop workstation-resident client applications that tie into a LAN DBMS server. The server is virtually useless unless software developers have the tools to build applications that access shared data files.

The quickest way to sour IS people on a LAN DBMS is to tell them it won't work with their favorite programming language. More is at stake than just personal programming style. A company may attempt to port stand-alone applications to the LAN DBMS only to find that the original language is not supported in the new environment, thereby stranding the original investment in programming labor.

Fortunately, the majority of LAN DBMSs surveyed will support at least one — and in many cases, several — third-generation programming languages, such as C, COBOL, FORTRAN, Pascal and Ada. Some LAN DBMSs come bundled with their own third-generation language compilers; most support popular third-party compilers.

There are several techniques by which commercial third-generation compilers can be made to produce executable client-side code capable of hooking into an SQL-oriented LAN DBMS server.

One is the precompiler, which converts embedded SQL statements into source-language statements prior to compilation. Another is the function call or application program interface (API). APIs are canned SQL subroutines installed on the client or server machine that can be called from the front-end application.

Many LAN DBMSs also provide a fourth-generation language programming environment. Fourth-generation languages let programmers build some of the main program elements — such as menus, screens and report formats — through a user-friendly graphical interface.

Once these pieces of the application have been specified, the corresponding source code is generated from stored procedure libraries. Fourth-generation languages may be especially attractive for companies where user programming is common.

Run time licenses usually allow developers to make unlimited copies of applications created with proprietary fourth-generation languages.

■ **User environment.** This refers to the full range of software front ends that provide users with access to the shared LAN data base.

Ideally, the location of data should be transparent to users. They should be able to access server-resident data as if it were stored on their own machines using the windowing environments, applications, query tools and single-user DBMSs of their choice.

A growing number of LAN DBMSs support clients that run IBM's OS/2 Presentation Manager, Microsoft's Microsoft Windows, Apple Computer, Inc.'s Macintosh Finder or other popular windowing environments.

Lotus Development Corp.'s 1-2-3 and other spreadsheets are supported as front ends by several data base servers, including GUPTA Technologies' SQLBase, Informix Software, Inc.'s Informix On-Line, Novell's NetWare SQL and Oracle's Oracle Server. Likewise, dBase III Plus applications can be written with hooks into data base servers such as SQL Server and Oracle Server.

The number and variety of LAN DBMS front ends will skyrocket over the next few years — particularly applications that talk to SQL Server, SQLBase, Oracle Server and NetWare SQL. Third-party vendors are tailoring spreadsheets, executive information systems, expert systems, fourth-generation languages and single-user DBMSs to work with the leading data base servers.

Data administration

In specifying the target LAN DBMS environment — operating, development or user — prospective buyers will be narrowing their choices to the few most promising products. The next criterion to consider is data administration: the LAN DBMS' ability to safeguard corporate data from loss, corruption, tampering and unauthorized disclosure.

The data administration features of LAN DBMSs fall into four main categories: security, concurrency control, data integrity and recovery.

■ **Security.** Most LAN DBMSs support password protection and access controls at some level.

"A good LAN DBMS should en-

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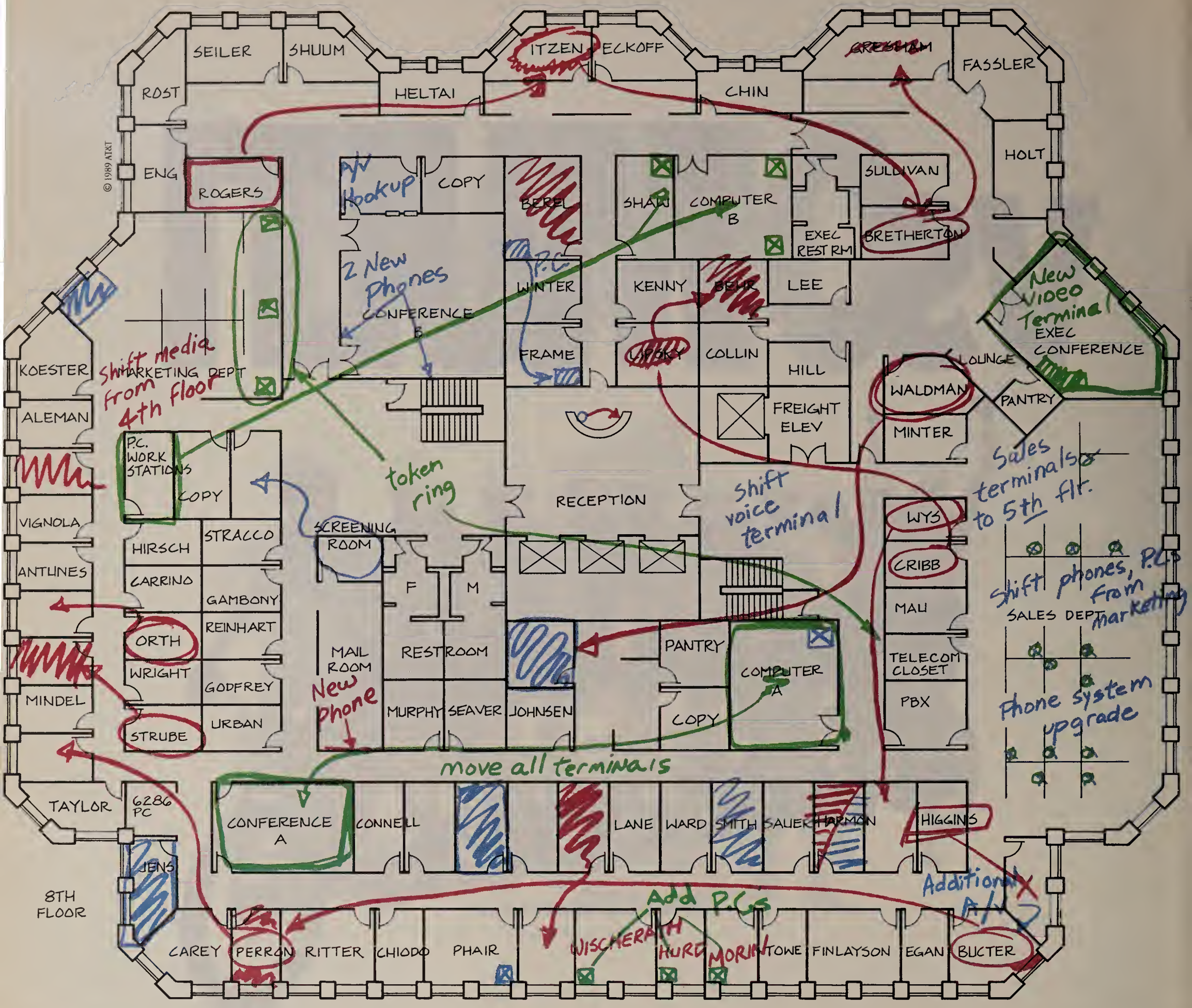

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able the system administrator to secure data values as low as the field level," says Richard Finkelstein, president of Performance Computing, Inc., a Chicago-based data base consultancy. "It should be possible to protect those field values against unauthorized reads or writes." The SQL GRANT and REVOKE commands provide a convenient means of assigning user views and privileges, Finkelstein says.

■ **Concurrency control.** One of the data administration requirements of LAN DBMSs that doesn't apply to single-user data bases is the matter of concurrency control. There must be some mechanism for granting users a temporary lock on information that they are modifying to prevent two or more concurrent users from accidentally overwriting one another's changes.

LAN DBMS products differ in the level and type of locking they permit. Record and file locking are about as deep as most LAN DBMSs go. Some DBMSs inform users when the data they are seeking has been locked and by whom.

Many data base systems allow several concurrent users to read a data element that has been write-locked by another. If the system has automatic screen refresh, read-only users can view data updates as they occur.

In a distributed data base environment, a locking protocol known as "two-phase commit" ensures consistency of data across multiple servers.

When two users are accessing the same data file concurrently, a situation called deadlock may occur. Deadlock happens when each user requires access to a data element locked by the other and each refuses to release the locks in their possession. The result is a standoff in which neither user can complete the transaction. Most LAN DBMS vendors have implemented schemes for preventing deadlocks or detecting and removing them, though different vendors take different approaches.

■ **Data integrity.** LAN DBMSs should also provide mechanisms for enforcing certain rules regarding the structure and content of shared data. Referential integrity refers to the maintenance of key-field relationships between linked data files in a relational data base. Semantic integrity is the ability to restrict data inputs only to certain "legal" values.

One important difference between file server and data base server configuration LAN DBMSs is the manner in which each enforces data integrity.

On a file server DBMS, each application program must provide its own referential and semantic integrity functions, if any, at the client workstation level. The server is dumb in the sense that it simply uploads and downloads whole data files on request; it pays little attention to the structure and contents of the files.

The main drawback to this arrangement is the potential for inconsistency among the various data integrity schemes that the client applications use. Any one of these applications can be the weak link that allows junk to be introduced into a shared data base.

Data base server DBMSs, by contrast, enforce data integrity right at the server. Referential integrity is usually provided through "triggers," which are stored SQL procedures that, for example, make sure deletion of a master record is automatically reflected in other files in which that record was referenced as a foreign key. Semantic integrity is enforced by means of "business rules," stored procedures that make sure, for instance, that customers cannot place a purchase order that exceeds their credit limit.

Server-enforced data integrity is the feature that best suits data base servers to handle mission-critical OLTP applications, says Leith Anderson, president of Ring Zero, Inc., a DBMS consultancy and publisher in Bloomington, Ind. The most sophisticated data base server in this regard is SQL Server from Ashton-Tate/Microsoft/Sybase, Anderson says.

Server-enforced data integrity is causing corporate IS to take LAN DMBSs more seriously, says Performance Computing's Finkelstein. "Mainframe people never bought off on file server DBMSs. However, data base servers can provide them with the levels of data integrity and performance to which they've grown accustomed."

■ **Recovery.** Mission-critical OLTP also requires strong data-recovery capabilities. Data recovery prevents hardware or software failures from corrupting the data base. It also ensures that data base transactions can be restored in spite of system failures.

LAN DBMSs have traditionally provided inadequate data recovery mechanisms, Finkelstein says. "Unfortunately, it's something that hasn't been addressed very well with traditional file server-based LAN DBMSs. A lot of data is being corrupted or lost because people haven't implemented procedures for backup and recovery," he continues.

However, Finkelstein says, today's data base servers provide recovery features on par with those available in mainframe and minicomputer environments. Two of the most important recovery capabilities are rollback and rollforward.

Rollback ensures that no incomplete transactions are applied to the data base. An incomplete transaction might happen when an update spans several data files on a single server or on multiple servers throughout the country.

In a multiple-server configuration, an incomplete update can result from the failure in mid-transaction of a communications link to any of the servers.

One way to handle this situation would be for the server that initiated the transac-

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Local-area network DBMS products (continued from page 51)

Vendor	Product	Hardware	Operating systems	Networks	Application architecture/ data base structure	Security	Recovery	Concurrency control	Data integrity	Application development tools	File import/ export	SQL-compatible?	Base price
InterSystems, Inc. Cambridge, Mass. (617) 621-0600	M/SQL	IBM PC, Sun 4 and SPARC-station	DOS, The Santa Cruz Operation, Inc.'s Xenix, Ultrix, Unix	Ethernet, terminal lines	Distributed data base/ relational	Password protection	Disk mirroring, incremental backup during data base update, journaling, rollback, roll-forward, automatic buffer write	Page and record locking	Triggers	Fourth-generation language with menu, screen and report builders; third-generation language support for ANSI MUMPS; data dictionary	ASCII, sequential files	Yes, with extensions	$1,900
LanQuest Group Corp. San Jose, Calif. (408) 283-8900	DATA-STORE: lan	IBM PC, XT, AT; Compaq Portable, Deskpro; Texas Instruments, Inc. Professional; HP 150; Tandy Corp. 1000, 1200, 2000; Wang Laboratories, Inc. PC; Zenith Data Systems Corp. 100, 150	DOS	NetWare, IBM PC LAN, Ethernet, Starlan, Arcnet, NETBIOS, Ungermann-Bass	File server/ relational	Password protection, access controls, data encryption, tamper detection, audit trails	Internal data integrity checks	Record locking	NA	Fourth-generation language with screen and report builders; third-generation language support for Basic, Pascal, C and Assembler	1-2-3, Wordstar, dBase III Plus, ASCII, DIF, Basic	No	$1,195
Micro Data Base Systems, Inc. Lafayette, Ind. (800) 344-5832	MDBS IV	IBM PC, XT, AT, PS/2; mini-computers	DOS 2.0 or later, OS/2	NetWare, IBM PC LAN, NETBIOS, LAN Manager	Data base server, distributed data base/ network	Password protection, access controls, data encryption	Transac-tion logging, roll-forward, rollback	Data base, relationship, group and record locking; deadlock detection and elimination	Range validation	Fourth-generation language with application and report builders; third-generation language support for C, COBOL, Basic, Pascal, Fortran, Guru and KMAN/2; data dictionary; user-defined queries	ASCII, DIF	Yes	Depends on modules pur-chased
Microrim, Inc. Redmond, Wash. (206) 885-2000	R:Base 3.0	IBM PC, XT, AT, PS/2	DOS 3.1 or later, OS/2	3Com, IBM PC LAN, NetWare, Starlan	File server/ relational	Password protection, access controls	Commit, rollback	File and table locking; automatic screen refresh; deadlock detection and elimination	Referential integrity	Fourth-generation language with menu, application and report builders; third-generation language support for C, Assembler, Fortran and Pascal; data dictionary	ASCII, DBF, DIF, 1-2-3, PFS-File, SDF, SYLK	Yes, with extensions	$725
MUST Software International Norwalk, Conn. (800) 441-6878	PC Nomad	IBM PC, XT, AT, PS/2	DOS, OS/2	NETBIOS, LAN Manager, asynchronous modem, 3270 data streams (LU 2), HLLAPI; interfaces to SQLDS, DB2, Teradata Corp. DBC/1012 DBMSs; front-end interface to GUPTA SQLBase and Ashton-Tate/Microsoft/ Sybase SQL Server	File server, data base server, distributed data base/ relational	Password protection, access controls, data encryption	Commit, rollback	NA	Referential integrity	Fourth-generation language with menu, screen and report builders; supports external data dictionaries, including DB2, SQLDS and Teradata; run-time version; CUA tool kit	dBase, DIF, 1-2-3, WKS	Yes, with extensions	$795
Novell, Inc. Provo, Utah (801) 379-5900	NetWare SQL 386 Version 2.1 and NetWare SQL Version 2.1	IBM PC AT, PS/2	DOS, OS/2	NetWare 386, NetWare 2.1 or later with Btrieve 5.00 or later on the server	Data base server, distributed data base/ relational	Password protection, access controls, data encryption	Disk mirroring, pre-imaging, rollback, roll-forward, transaction logging	Record locking; deadlock detection and elimination	NA	XQL application programming interface, third-generation language support for Basic, C, Pascal and COBOL programming languages; royalty-free run-time version; data dictionary; supports Concentric R + R, 1-2-3 V. 3.0, Advanced Revelation, Wordtech Quicksilver and Wordtech dBXL as front ends	NA	Yes, with extensions	$1,495 (NetWare SQL 386 V. 2.1), $595 (NetWare SQL V 2.1)
	NetWare Btrieve Version 5.1	IBM PC, XT, AT, PS/2	DOS 3.1 or later, Windows, OS/2, Xenix	NetWare, IBM PC LAN	File server, data base server/ relational	Password protection, access controls, data encryption	Pre-imaging, rollback, roll-forward, transaction logging	Record locking; deadlock detection and elimination	NA	XQL application programming interface with report builder and ad-hoc query; third-generation language support for Basic, C, COBOL, Pascal, Fortran, Modula-2 and APL; royalty-free run-time version	NA	Yes	Bundled with Net-Ware; $350 for non-Novell network versions
Oracle Corp. Belmont, Calif. (800) 345-3267	Oracle Server	IBM PS/2	OS/2, Unix, Xenix	3Com, Banyan, DEC, IBM PC LAN, NETBIOS, NetWare, SNA, LAN Manager, APPC/LU 6.2, TCP/IP; interfaces to Oracle DBMSs on minicomputer and mainframe platforms, as well as to IBM's DB2 and SQLDS DBMSs and DEC's RMS DBMS	Data base server, distributed data base/ relational	Password protection, access controls, auditing	Journaling, redo log, after-imaging, rollback, roll-forward, transaction logging	Row locking	Referential integrity	Fourth-generation language with forms, menu, report and application builders; third-generation language support for C, COBOL, Ada, PL/1, Fortran and dBase; data dictionary; supports 1-2-3 and dBase III Plus as front ends	ASCII, dBase, 1-2-3	Yes, with extensions	$2,499
Precision Software, Ltd. Irving, Texas (800) 562-9909	Superbase 4 Version 1.1	IBM PC XT, AT, PS/2	DOS 3.2 or later with Microsoft Windows	LANs, asynchronous	File server/ relational	Password protection, access controls	Auto-save	System, file and record locking	NA	Fourth-generation language with screen and report builders; supports Dynamic Data Exchange protocol; run-time version	ASCII, dBase, 1-2-3, Excel, Logistix, DIF, TIFF, PCX, IMG, WMF, CCITT Fax Group III	No	$995
Progress Software Corp. Bedford, Mass. (617) 275-4500	Progress Version 5.2	IBM PC, XT, AT, RT, PS/2; Macintosh; DECstation; HP 9000 Series 300; MIPS; Olivetti Personal Mainframes; Sun	DOS, AIX, CTOS/ BTOS, Ultrix, A/UX, Unix, Xenix, VAX/VMS	Decnet, OpeNET, NETBIOS, NetWare, TCP/IP	Data base server, distributed data base/ relational	Password protection, access controls	Rollback, roll-forward, transaction logging, pre-imaging	Record locking	NA	Fourth-generation language with menu, report, screen and query builders; third-generation language support for C; data dictionary	ASCII, dBase, DIF, SYLK	Yes, with extensions	$1,050

This chart includes a representative selection of vendors in the local-area network data base management system market. Vendors may offer other local net DBMSs, and vendors not included may offer a full range of competitive products.

SOURCE: JAMES KOBIELUS, ALEXANDRIA, VA.

Local-area network DBMS products

Vendor	Product	Hardware	Operating systems	Networks	Application architecture/ data base structure	Security	Recovery	Concurrency control	Data integrity	Application development tools	File import/ export	SQL-compatible?	Base price
Raima Corp. Bellevue, Wash. (206) 747-5570	DB Vista III	Microcomputers, minicomputers and mainframes	Macintosh, DOS, Windows, OS/2, QNX, Ultrix, Unix, Xenix, SunOS, VAX/VMS	3+, Banyan, NETBIOS, NetWare, Univation, LifeNet, AppleShare	File server/ relational, network	NA	Roll-forward, transaction logging	Record and file locking	Referential integrity	Fourth-generation language with report and query builders; third-generation language support for C; royalty-free run-time license; data dictionary	ASCII, 1-2-3, WKS	Yes, with extensions	$695
Revelation Technologies, Inc. New York (800) 262-4747	Advanced Revelation 2.0	IBM PC	DOS 3.1 or later, OS/2	3Com, Banyan, IBM PC LAN, Ungermann-Bass, NetWare	File server/ relational	Password protection	Rollback, transaction logging	System locks out other users during data manipulation	NA	Fourth-generation language with menu, report and screen builders; third-generation language support for C and Assembler	ASCII, DBS, 1-2-3, WKS	Yes, with extensions	$995
Sterling Software, Inc. Zanthe Systems Division Ottawa, Ontario (800) 267-9972	ZIM 3.0.2	IBM PC XT, PS/2; Unix-based machines	DOS 2.1 or later, OS/2, Unix, Xenix, AOS/VS, VM/CMS, VAX/VMS	LAN Manager, NetWare, MS-Net	Data base server/ relational	Password protection, access controls, data encryption	Rollback, roll-forward, transaction logging	Record locking	NA	Fourth-generation language with menu and report builders; third-generation language support for C; run-time version; data dictionary	ASCII	Yes	$1,725
Sybase, Inc. Emeryville, Calif. (415) 596-3500	Sybase SQL Server 4.0	IBM PC, XT, AT, RT, PS/2; DEC VAX and DECstation 3100, AT&T 3B2 and 6386, HP 9000, Next Computer System, Sun workstations, Pyramid MIServer, Stratus VOS, Macintosh	OS/2, Unix, VMS, Macintosh, Ultrix	DECnet, LAN Manager, TCP/IP	Data base server, distributed data base/ relational	Password protection, access controls, auditing	Disk mirroring, journaling, rollback, roll-forward, transaction logging, two-phase commit	Page and browse-mode locking; deadlock detection and elimination	Triggers, stored procedures, defaults, server-enforced business rules	Fourth-generation language with application, menu, query, forms, application and report builders; third-generation language support for C, Ada, COBOL, Fortran and Pascal; run-time license; interfaces to non-Sybase DBMSs and programming tools; data dictionary	ASCII	Yes, with extensions	$2,495
Unify Corp. Sacramento, Calif. (916) 920-9092	ACCELL/ SQL	Unix-based machines	Unix	TCP/IP, interfaces to Oracle, Sybase and The Santa Cruz Operation Integra DBMS	File server, distributed data base/ relational	NA	Disk mirroring, journaling, rollback, roll-forward, transaction logging	NA	Referential integrity	Fourth-generation language with application, menu and report builders; third-generation language support for C and COBOL; data dictionary	ASCII	Yes, with extensions	$2,995
Unlimited Processing, Inc. Jacksonville, Fla. (904) 731-8339	Team-Up	IBM PC, XT, AT	DOS 3.0 or later	IBM PC LAN, 3Plus, NetWare, Ungermann-Bass, DNA, Banyan, NETBIOS	File server, distributed data base/ hybrid relational, hierarchical net	Password protection, access controls, data encryption, audit trails	Rollback	Automatic record locking, automatic screen refresh	NA	Fourth-generation language with application and menu builders; third-generation language support for C and Assembler	NA	No	$1,795
VersaSoft Corp. San Jose, Calif. (408) 723-9044	dbMAN Version 5.2	IBM PC, XT, AT, PS/2	DOS, Unix, Xenix, AIX, SX/AR, SunOS, UTS	NetWare, IBM PC LAN, Ethernet, 3+, Starlan, IBM Token-Ring, Arcnet, Grapevine, PC-MOS, NETBIOS, Promise LAN	File server/ relational	Password protection, data encryption	Rollback	File and record locking	NA	Fourth-generation language with report builder; supports dBase programming language with compiler; run-time license; user-defined functions	NA	NA	$595
VIA Information Systems Corp. Princeton, N.J. (609) 243-0433	VIA/ Distributed Relational Environment 1.2	IBM PC AT, PS/2	DOS 3.1 or later, OS/2, Unix, Xenix, AIX	NetWare, IBM PC LAN, NETBIOS, Banyan, X.25	Data base server, distributed data base/ relational	Password protection, access controls, data encryption	Check-points, field history, journaling, rollback, roll-forward, transaction logging	Proprietary nonlocking concurrency control	NA	Fourth-generation language with menu and screen builders; third-generation language support for object-oriented C; data dictionary; supports front-end interfaces to Database Applications NPL/R and Microsoft Excel	ASCII, DIF, Excel, 1-2-3, SYLK	Yes, with extensions	$995
WordPerfect Corp. Orem, Utah (801) 225-5000	DataPer-fect	IBM PC, XT, AT, PS/2	DOS 2.1 or later	NetWare, Banyan, IBM PC LAN, Ethernet, 3+, Starlan, LANsmart, IBM Token-Ring	File server/ relational	Password protection, access controls	Auto-save, transaction logging	File locking, automatic screen refresh	NA	Fourth-generation language with screen and report builders; run-time license	NA	NA	$595
Wordtech Systems, Inc. Orinda, Calif. (415) 254-0900	dBXL/LAN	IBM PC XT	DOS 2.0 or later	NetWare, 3Com, IBM PC LAN, Banyan; front end to SQL data base servers	File server/ relational	NA	NA	File and record locking, concurrent browsing, automatic screen refresh	NA	Proprietary programming language consisting of dBase language plus extensions; user-defined functions	dBase III Plus	No	$599
XDB Systems, Inc. College Park, Md. (301) 779-6030	XDB Database Server	IBM PC XT, AT, PS/2	MS-DOS, OS/2	NetWare, NETBIOS	Data base server, distributed data base/ relational	Password protection, access controls	Pre-imaging, after-imaging, transaction logging, roll-forward, rollback, backup	Record and table locking	Referential integrity, server-enforced business rules	Fourth-generation language with report and menu builders; third-generation language support for C, COBOL and Pascal	dBase, DIF, ASCII, SYLK	Yes, with same extensions as DB2	$1,995

AFP = Apple Filing Protocol
APL = A Programming Language
CUA = Common User Access
DBF = dBase Format
DIF = Data Interface File
DNA = Digital Network Architecture
HFS = Hierarchical File System
HLLAPI = High-Level Language Application Program Interface
IMG = Image file extension
MUMPS = Massachusetts General Hospital Utility Multiprogramming System
NA = Information not available
NFS = Network File System
PCX = Graphics file extension
PRN = Print file extension
REXX = Restructured Executive External Language
RFS = Relational File System
SDF = Standard Data Format
TIFF = Tagged Image File Format
WKS = Worksheet file extension

This chart includes a representative selection of vendors in the local-area network data base management system market. Vendors may offer other local net DBMSs, and vendors not included may offer a full range of competitive products.

SOURCE: JAMES KOBIELUS, ALEXANDRIA, VA

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to department

until finally

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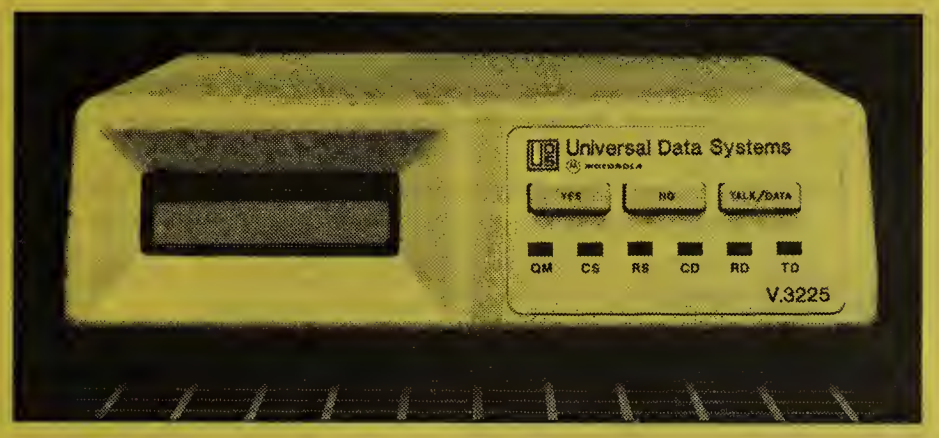

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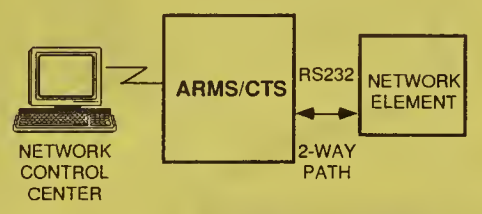

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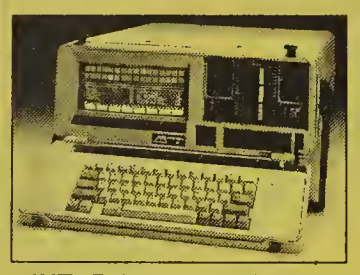

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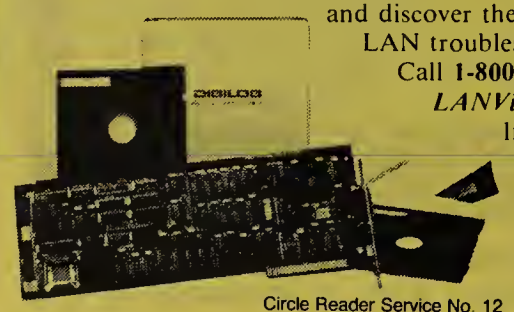

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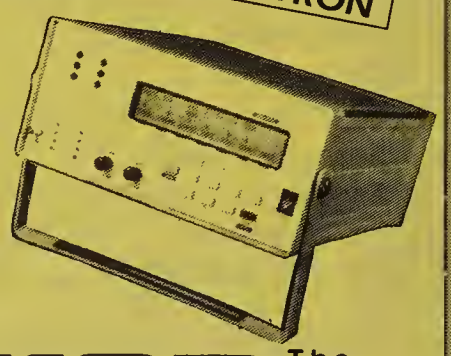

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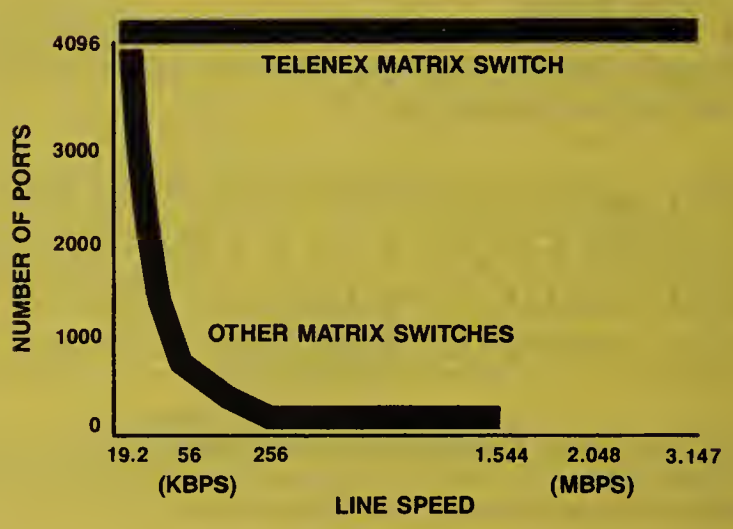

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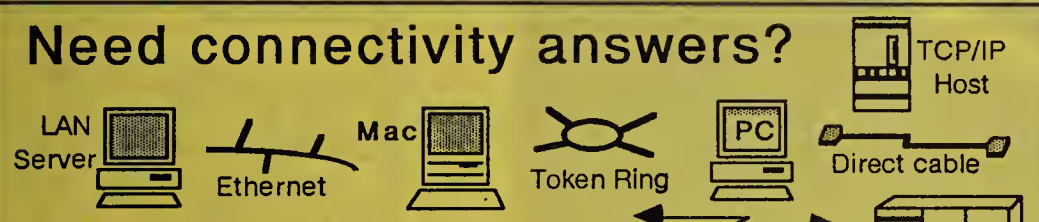

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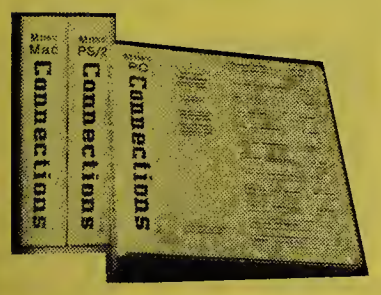

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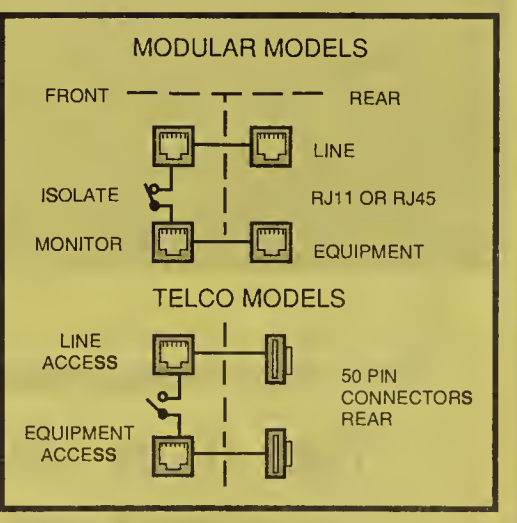

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(continued from page 57)
tion to tell the others to back out of it. This would cause the servers to wipe the incomplete update from their transaction journals and return their respective data files to their pretransaction states, which are retained intact until the transaction is committed. The server that lost its communications link might back out of the transaction after a prespecified time interval.

Rollforward ensures that a lost or corrupted data base can be restored by reapplying completed transactions to a previous backup. Ideally, the transaction log and backup should be maintained on separate computers or storage devices than the live data base. Backups could be performed at regular checkpoints or incrementally with each update to the data base.

Another useful data recovery feature is automatic buffer write. Quite often, a completed transaction is stored in the server's buffer memory for some time before being written to disk. Consequently, users may be lulled into a false sense of security not realizing that the transactions are still in a volatile storage area.

According to Finkelstein, one of the problems with NetWare as a platform for a LAN DBMS is that it provides "no way to force that write to disk."

Most users can sum up their LAN DBMS performance requirements in four simple words: the faster, the better. They want the shared data base to respond as quickly as a single-user stand-alone DBMS under all conditions.

Unfortunately, performance — usually measured in transactions per second — is the most difficult criterion on which to compare LAN DBMSs since, for the most part, it can be measured only after the system has gone live. It is acutely sensitive to all facets of the system, including hardware, software, networks, traffic and so forth. However, three rules of thumb apply when evaluating potential performance of a LAN DBMS.

■ **Rule 1:** Don't trust benchmarks. Most consultants agree that published LAN DBMS benchmarks are, at best, an imperfect measure of performance and, at worst, a self-serving marketing tool propagated by vendors.

Even apparently objective tests based on industry-standard benchmarks, such as TP-1, are subject to bias because the standard is open to different interpretations by different testers, says Hal Chapel, president of Vanguard Business Solutions, Inc., a systems integration firm in Sausalito, Calif.

"I have been involved in DBMS tests where different interpretations of the same benchmark, TP-1, produced very different performance figures," Chapel says. "For example, different data base locking methods can make a big difference in transaction throughput."

Business Systems Group's Papermaster recommends that users run pilot tests on LAN DBMSs, running prototype applications under an operating environment and loading conditions as close to the live system as possible. Alternately, they can ask vendors to put them in touch with current users who have similar environments, applications and transaction loads.

■ **Rule 2:** Make sure the LAN DBMS' application architecture has been optimized to work in your company's network environment, whether it be LAN or WAN. As indicated previously, a data base server architecture almost always performs better than a file server LAN DBMS under similar applications and loading conditions.

In a distributed data base environment, an important feature is cost-based optimization. This is an algorithm that calculates which server can most efficiently process a particular transaction involving joining multiple files.

■ **Rule 3:** Determine whether the server and network on which the LAN DBMS will run have been optimized for OLTP.

According to Papermaster, most published LAN DBMS benchmarks are performed on Intel Corp. 80286- or 80386-based machines that are underpowered for OLTP. "A LAN superserver, such as the NETFRAME [Systems, Inc. NF400] or the Compaq Computer Corp. SystemPro, will increase your transaction throughput substantially," he says. "Likewise, you can run a multiuser DBMS on a Tandem Computers, Inc. or other OLTP machine and get an order-of-magnitude increase in throughput."

Deterministic LAN protocols such as token ring work best under heavy OLTP loading, says Ring Zero's Anderson.

A niche to fill

The future of LAN DBMS technology belongs to data base servers. However, there is still a niche for LAN DBMSs with file server configurations. They represent a long-established software technology that is generally easier to install and maintain than data base servers and for which a lot more applications are available.

According to Vanguard Business Solutions' Chapel, file server LAN DBMSs are best suited for low-volume, unsophisticated applications that involve few multiple-file updates.

Perhaps as important as the technical features of the product are the service and support provided by the vendor. Does the vendor provide adequate training and dial-up assistance for developers and users? Is the vendor serious about upgrading and improving the product over time, extending the range of operating environments, development tools and user interfaces the product supports?

These are important considerations because a LAN DBMS is more than just a technology. For users, the LAN DBMS is a strategic environment, something that will play a central role in their firm's business operations. Evaluating LAN DBMSs is not a task users can afford to take lightly.

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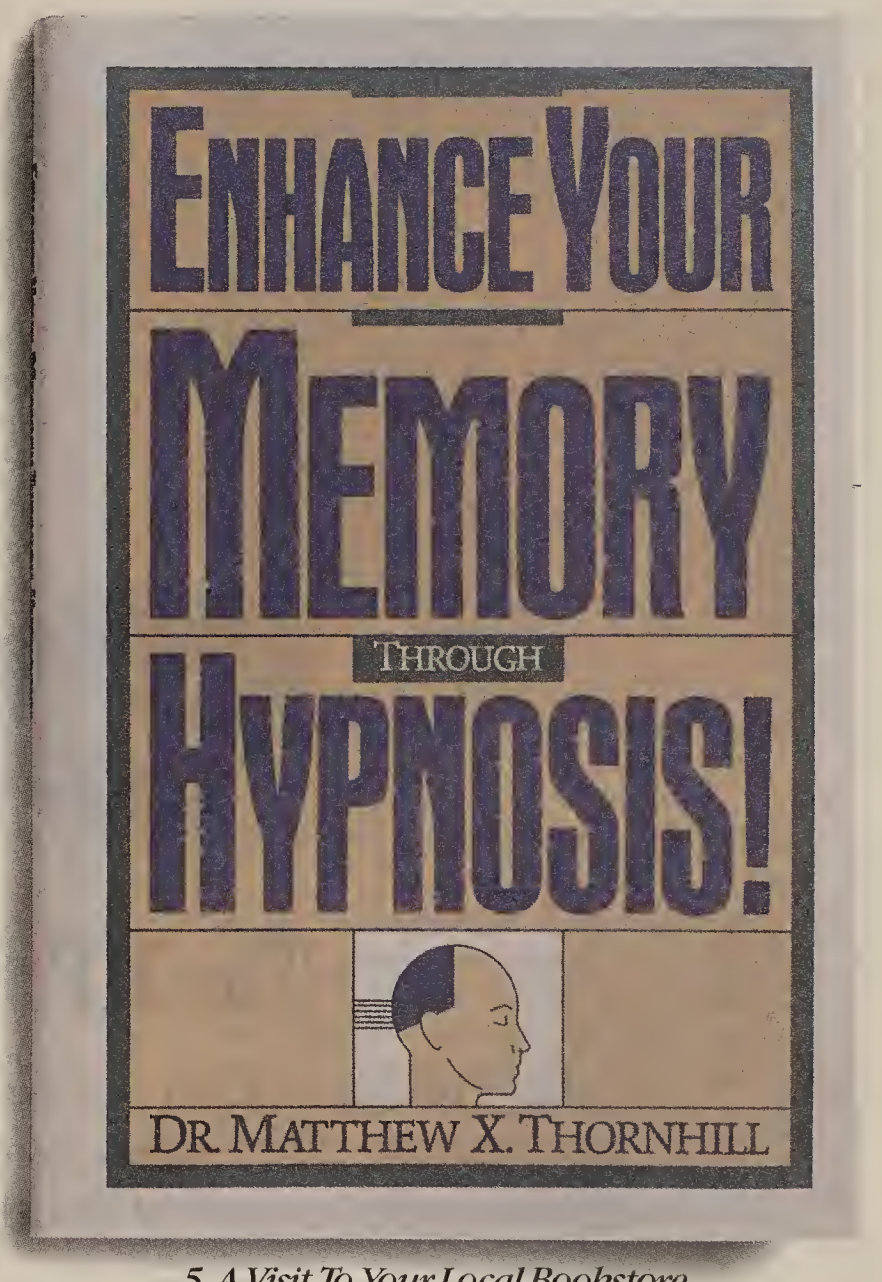

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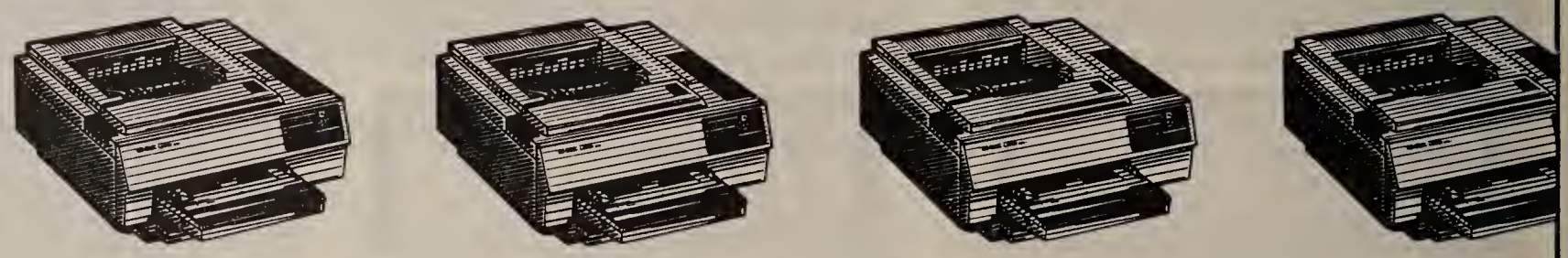

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Unable to complete your ISDN call?

continued from page 46

One ray of hope, according to terminal adapter manufacturers, lies in what is called the low-level compatibility byte, which is an information element that is passed end to end through the ISDN network. It contains information about the sending unit's rate adaption technique, as well as other variable information that could help the receiving device adapt to a changing data transmission environment.

Unfortunately, in Northern Telecom's current ISDN software implementation, the switch does not pass on this low-level compatibility byte. "The network just eats it; it never gets to the other end through a DMS-100," laments Gene Litt, a member of the technical staff at Teleos Communications, Inc. in Eatontown, N.J., which makes ISDN data and voice access equipment for systems integrators. Third-party equipment vendors agree that AT&T's 5ESS does forward this element and deliver it intact to the destination device.

Northern Telecom acknowledges this problem and says that it, too, will be corrected in a future DMS software release.

Singing the same song

Taken in total, all of the current ISDN incompatibility problems appear to center around AT&T and Northern Telecom implementation differences. To be fair, however, the lack of a single central organization to orchestrate the testing and ironing out of implementation and feature differences is also a major contributing factor.

Equipment vendors report that with the rate and scope of switch software changes, and because so many vendors are seeking to recheck their product implementations for compatibility, testing is typically done at the first available location — at AT&T, Northern Telecom, a regional Bell holding company (mainly BellSouth Corp. and Ameritech) or even at BELLCORE. Except for AT&T and Northern Telecom, phone company testing may involve either a simple simulation or an incomplete beta-test version of the new switch software.

BELLCORE has also come under fire from the vendor community for its deliberate — some charge lethargic — procedures and delays in delivering solid ISDN specifications. "BELLCORE is playing a low-profile role," Aitchison says. "I'm a little disappointed in them, frankly."

The overriding need for a strong central ISDN standards-setter could force that responsibility and role to shift away from BELLCORE. A likely new ISDN standard-bearer would be the North American ISDN Users (NIU) Forum, which includes different contingents of both end users and customer premises equipment vendors.

Some believe, in fact, that ISDN specifications under development by the NIU Forum could even end up as part of the Government Open Systems Interconnection Profile. And this, they say, could establish a de facto federal role in establishing and ensuring future ISDN compatibility and interoperability in the U.S.

Readers air views on Robert Morris

continued from page 38

intentional criminals," he said.

Intent was also a key factor for Lee Paynter, vice-president of research and development with Valley Forge, Pa.-based JW Pepper and Son, Inc., who wrote: "Given that the havoc, although not the act, was unintentional, the sentence was appropriate."

Wrote Stacie Boughn, a systems consultant with AT&T in Baltimore, "In white-collar crimes such as this one, why waste more money — some of which comes from the tax dollars of these same victims — sending a man to jail?"

Restitution

But Boughn brought up something echoed by several others: Morris should have been forced to pay restitution for the damage that occurred. "The way to get things back to normal . . . would be to have Morris pay out of his own pocket. Penalties and fines, while a step in the right direction, are misguided because none of the money will go to the victims of Morris' prank."

Other readers concurred. "Does the punishment fit the crime? No, no, a thousand times, no!" wrote Donald Justice. "He should be prohibited from accessing any system for a period of time. Prior to sentencing, he should have made some agreement to make financial restitution to the damaged parties so that the lengthy civil recourse process could be averted."

Added Somerset Business Services' Miller, "It's not enough to punish the criminal; the victims of a crime also must be justly compensated. The fine goes to the state, not the victims, who often stand helpless and without recourse."

On the subject of whether Morris' actions increased security awareness among users, Bruce Fowler, president of Laboratory Professional Systems Corp. in Cambridge, Mass., commented: "Morris should get a national service medal for exposing major national security vulnerability without doing any real damage. The most significant side effect of his security demo was slamming a lot of network managers' egos in the door. It's too bad he has a felony record to live with."

However, New York Audit Department's Nelson acknowledged, "It's like when a burglar robs your neighbor's house. You may lock your door for a few nights, but you'll slip back into your old habits sooner or later. You're either security-conscious or you're not."

Thanks for sharing your opinions with us.

NW panel speaks out on ISDN

continued from page 1

of Data Communications Users, the Committee of Corporate Telecommunications Users, the Communications Managers Association, the International Communications Association, the Tele-Communications Association, Inc. and the Wall Street Telecommunications Association.

Use of ISDN

For the most part, users said they don't think ISDN will be a key asset in their network portfolios in the short run. Only two of of the 14 panel members surveyed said ISDN will play a major role in their company's network strategy in the next two years.

However, about two-thirds of the panel members said ISDN will be widely used by corporations in the next five to 10 years. The majority of members said they think ISDN services will be widely available in the next five years.

Of the 14 panel members surveyed, three are currently using ISDN Basic Rate Interface (BRI) service. Only one of those users is employing BRI to support production applications. Of those companies not using BRI, five said they are planning to implement the service in the future.

Four members of the panel reported that they are currently using ISDN Primary Rate Interface (PRI) service, but only one of those is using PRI to support production applications. Three users not using PRI said they plan to employ the service.

"ISDN technology itself is not the important thing," said Laurie Bride, manager of network architecture and standards at Boeing Computer Services in Seattle. "The tremendous value, from a data transmission standpoint, would be to have a national data service based on ISDN that would allow us to establish communications with other firms using ISDN.

"Europe and Japan are building these countrywide data networks," she said. "The U.S. will be at a severe disadvantage by the mid-1990s if we don't have a similar capability."

Nine panel members said they are evaluating which existing applications could be supported more efficiently by ISDN. An equal number said they are evaluating new applications.

Nearly all the users surveyed said ISDN's usefulness today is hampered by its limited availability and slow deployment.

And deployment of ISDN services is a major concern. Eleven panel members said they agreed or somewhat agreed when asked whether ISDN will only be useful when it is widely deployed.

Local carriers came under fire for their slow pace in offering ISDN services. More than two-thirds of the members agreed with the statement that local telephone companies are moving too slowly in offering ISDN. An equal number also agreed that local telephone companies are not keeping pace with long-distance carriers in deploying ISDN.

> "There is much overselling by the sales and marketing people in the industry."
>
> ▲▲▲

Long-distance carriers got mixed marks for their ISDN efforts. Six members said long-haul companies are moving too slowly in offering ISDN services, while eight others said they disagreed or were uncertain.

A perceived lack of ISDN applications was a major concern of users. Only three panel members disagreed with the statement that ISDN's usefulness is limited by a lack of applications.

Members of the panel expressed concern and some confusion about the cost of ISDN products and services. This appears to be a major roadblock to implementation of ISDN. All but one panel member agreed or somewhat agreed that confusion concerning the cost of ISDN products and services is keeping users from employing or planning to employ the technology.

"I remember giving my first ISDN lecture at a trade show in 1985 and saying that ISDN would blossom in two or three years," said Len Evenchik, director of communications for The Commonwealth of Massachusetts. "All that was missing were the tariffs. Once the tariffs were in place, users could make a straightforward cost/benefit analysis. We're still waiting for the tariffs."

Nearly all of the panel members agreed that the cost of purchasing new equipment or upgrading equipment to support ISDN is a major factor in the decision to use the technology.

Half of the members said current ISDN services are too expensive, and slightly more than half said ISDN products are too expensive.

Another issue cited was incompatibility. Thirteen of the 14 panel members said they are concerned about incompatibility of ISDN products.

The global reach of ISDN services is also a high priority. More than two-thirds agreed with the statement that availability of international ISDN services is important to most users.

How it stacks up

When asked about ISDN in relation to existing network services, most users disagreed with the statement that current products and services already meet the networking needs ISDN was designed to address.

About two-thirds said ISDN offers sufficient transmission capacity for current networking needs. But more than half said they think ISDN won't offer the capacity required for future applications.

Is ISDN being hyped by vendors? Users say yes. Nearly all panel members said they agreed or somewhat agreed that vendors and carriers are hyping the capabilities of ISDN.

"There is much overselling by the sales and marketing people in the industry," Gillerman said. "But the technical people from these same companies tend to undersell and downplay the capabilities of ISDN."

Will ISDN play a major role in your company's network strategy in the next two years?

Yes = 2
No = 7
Uncertain = 5

Are local telephone companies moving too slowly in offering ISDN services?

Yes = 11
Uncertain = 3

Are you concerned about incompatibility of ISDN customer premises equipment?

Yes = 13
No = 1

Is the cost of purchasing new equipment or upgrading customer premises equipment a major factor in your decision to use ISDN?

Yes = 12
No = 2

ISDN's usefulness is hampered by its limited availability and slow deployment.

Agree = 12
Somewhat agree = 2

ISDN's usefulness is limited by a lack of applications.

Agree = 1
Disagree = 3
Somewhat agree = 9

Confusion about the cost of ISDN services is keeping users from employing the technology.

Agree = 7
Somewhat agree = 6
Don't know = 1

Vendors and carriers are hyping the capabilities of ISDN.

Agree = 8
Disagree = 2
Somewhat agree = 4

NetWare 386 3.1 improved

continued from page 2

said. "Important resource hooks are now available that will allow Novell and other vendors to develop powerful utilities and other administrative tools."

Chief among these hooks is an open C-library interface to the NetWare kernel. This gives server-based applications access to all NetWare services so third-party developers do not have to duplicate in their software any functionality that already exists in the operating system.

The opening of the NetWare kernel, along with a Portable Operating System Interface (POSIX) that provides a simple DOS-like programming environment, should speed development of server-based applications, said John Edwards, Novell's product line manager for NetWare 386.

Oregon State's Scott agreed. "There is a tidal wave of [NetWare Loadable Modules] somewhere just behind us, and it is coming fast," he said. NetWare 386 has a modular architecture, and all server-based processes that are not part of the operating system kernel — including utilities, data base engines, and network drivers and protocols — run as NLMs.

In the new 3.1 release, these modules for the first time can be loaded and unloaded dynamically as needed, without taking down the server and rebooting it. When a user invokes an NLM that requires one or more prerequisite NLM process to be running, the dependent NLMs are automatically loaded in proper sequence by the server.

NetWare 386 3.1 has a consistency-checking feature that looks after all the NLMs to make sure they are obeying the rules and not hogging CPU cycles or memory, for example.

Along the same lines, a new resource management facility can be used to track and control all hardware and software resources requested by NLMs. This facility can also clean up after NLMs that unload or terminate suddenly while leaving the resources they were using in an improper state.

The new NetWare version also for the first time implements the full Open Datalink Interface (ODI). Announced more than two years ago by Novell in conjunction with Apple Computer, Inc. and several other vendors, ODI is a standard interface that enables multiple protocol stacks to share the same network adapter simultaneously.

Novell has used this interface in its server drivers so that a single network interface card in a 3.1 server can support multiple frame types over a single physical cable. This enables users to mix workstations, for example, with pre-802.3 and 802.3 Ethernet adapters on the same local-area network segment.

ODI is a key part of NetWare 386's "protocol engine," which is also putting in its first appearance in the 3.1 release. Based on the Streams interface that is part of Unix System V.3 and higher, the protocol engine will ultimately enable a NetWare 386 engine to multiplex a variety of network protocols along with NetWare's native Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX). This in turn will let the server support multiple client types — Macintoshes, Unix workstations, and DOS and OS/2 systems, for example — on the same LAN.

Release 3.1 includes only the IPX/SPX transport, but Novell's Edwards said modules for AppleTalk, Network File System, Transmission Control Protocol/Internet Protocol, Systems Network Architecture and Open Systems Interconnection File Transfer, Access and Management (FTAM)

(continued on page 74)

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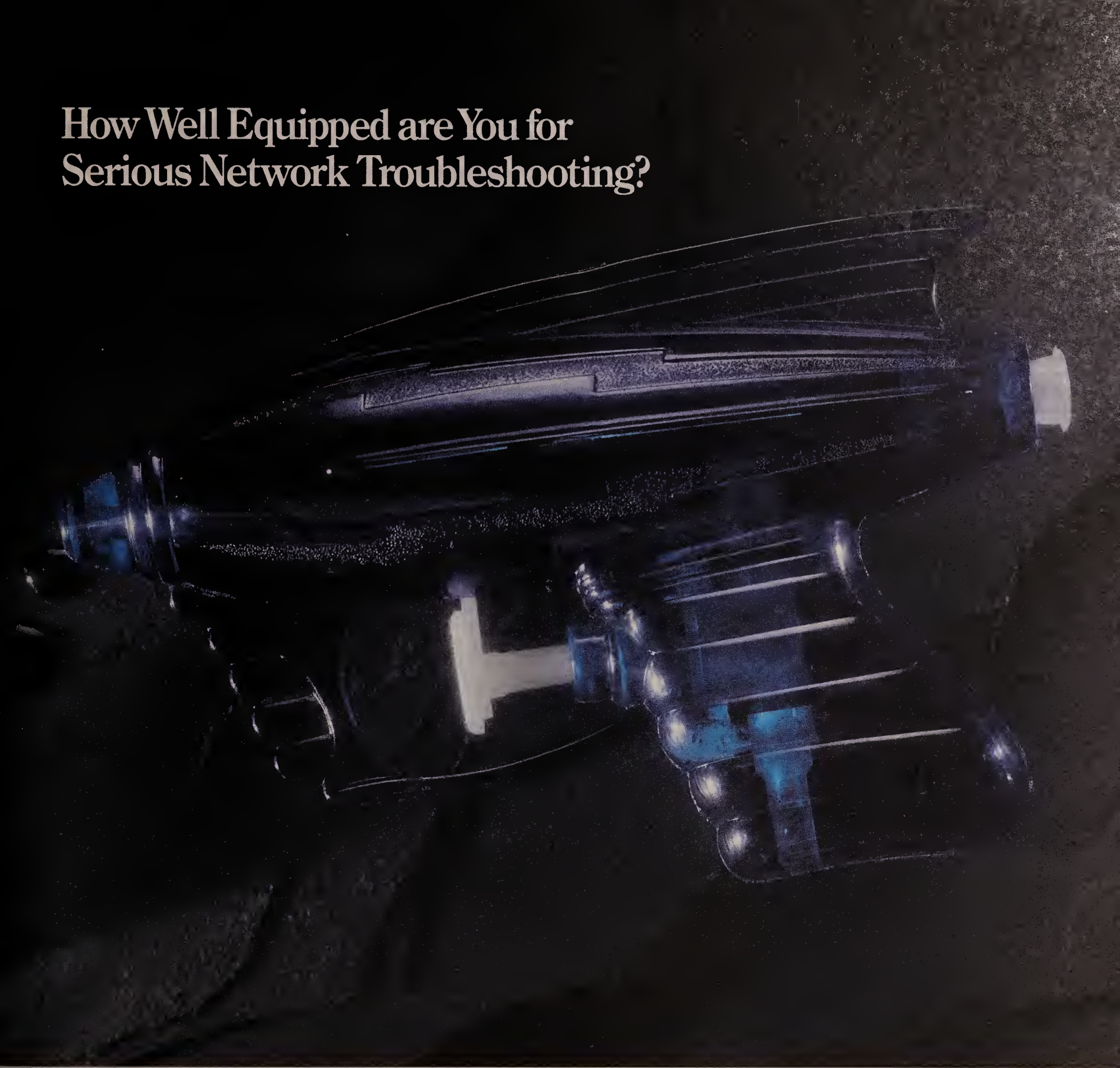

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See The FAXNet Form on Page #68

DEC offers EDI software, consulting

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For example, an inventory control application running on one computer can automatically send a message across the network to a DEC/EDI Translation Server on another system to generate a purchase order when the quantity of a certain part falls below a specified level.

Once translated, the EDI document is shipped to DEC/EDI Communications Server software, which acts as a gateway between a company's internal network and a private or public EDI network.

Analysts said the ability to distribute DEC/EDI software across a network will help users make better use of processing resources. For instance, large companies can install DEC/EDI Translation Servers in remote locations that communicate with a centralized DEC/EDI Communications Server. This will enable them to use less expensive VAXes to translate documents into an EDI format while maintaining a single link to an EDI network.

"DEC is leveraging its name and its experience with networks to get into the EDI market," said David Atlas, senior analyst for electronic messaging with International Data Corp., a Framingham, Mass.-based market research firm.

Atlas added that DEC's consulting services will set it apart from its competitors. Those services will help users reorganize internal operations to support an EDI program and make sure their trading partners will support EDI in the same manner.

With the Price Waterhouse and Coopers & Lybrand alliances, "DEC will be able to go into a place and set up EDI with a lot more ease than could be done otherwise," Atlas said. "DEC is taking primary responsibility for putting the whole thing in place."

However, the fact that DEC/EDI will only run on VAXes could be a limiting factor to DEC's success.

"I don't know how many companies that want to do EDI also have VAXes," Input's Byles said.

DEC/EDI software is scheduled to be available in September. Pricing starts at $10,324. The consulting services are available under contracts with custom pricing and are available now.

DCA announces Windows software

continued from page 8

Irma WorkStation for Windows also enables a DOS workstation to emulate an IBM Type 2.1 device, which enables the personal computer to conduct APPC sessions with a host.

Until now, DCA only offered APPC support on its Select Communications Workstation, an OS/2-based software package that enables a personal computer to access minicomputers and a variety of mainframe hosts over IBM Systems Network Architecture networks, Kengus said.

Irma WorkStation for Windows is scheduled to ship in late summer. It costs $495 per workstation.

NetWare 386 3.1 improved

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would be available for the engine before year end. Meanwhile, third parties can also use the engine's open application program interfaces to build their own protocol modules.

"Looking ahead to next year, I see NetWare 386 as a hub, a protocol multiplexer acting as peacemaker in that multivendor Tower of Babel out there," said Kanwal Rekhi, executive vice-president at Novell.

One thing that could help NetWare 386 play such a role is a unique new facility in Version 3.1 that accommodates the different file systems and associated naming conventions in the various client operating systems. Without this facility, a DOS client using 11-character names could not "see" a file on the server that was created by a Macintosh client with its 32-character naming convention, for example.

The new name-space facility in 3.1 uses an object-oriented approach, dividing a file on the server into file and name objects. When a file created by one type of client is to be shared by other client types with different naming conventions, NetWare generates multiple name objects — one for each client file system.

Grover Righter, director of software engineering at Novell, said this is a revolutionary feature unique to NetWare and one that is likely to be imitated in other operating system environments in the future. "These new name spaces are to file systems what relational data bases were to flat [Index Sequential Access Method] data bases years ago," Righter said.

Enhancements to NetWare's own file system in Release 3.1 speed up disk access by at least 25% and allow users to mount server volumes two to three times faster than could be done in Version 3.0. "For example, a 10G-byte volume mounts in under 10 minutes," Edwards said.

Other file system improvements include support of removable storage media, such as those used in erasable optical or write once, read many drives, and the ability to mount 64 volumes per server, which both improves server performance and enables NetWare to support multiple-platter optical jukeboxes.

Additional enhancements in Release 3.1 include expanded support of IBM Token-Ring Networks and source routing, and drivers for IBM's new Small Computer System Interface disk subsystems.

NetWare 386 3.1 is priced at $7,995. However, customers that purchased Version 3.0 will receive an upgrade free of charge.

DEC offers document mgmt. for DECnet

continued from page 1

terconnection's Office Document Architecture.

DDIF provides a common way for different vendors' applications to share files used to create compound documents.

Basing its Document Management products on CDA gives DEC an edge over other vendors, analysts said. AT&T's Rhapsody groupware product, announced in March, does not have a DDIF-like component ("AT&T targets office with LAN groupware," *NW,* April 2). AT&T must work with vendors to build file format conversion routines into applications to enable one application to retrieve files created by another.

"Digital was planning these products way before AT&T ever got into this market," said Krystyna Filistowicz, industry analyst with Dataquest, Inc., a San Jose, Calif.-based market research firm. "In terms of functional capability, Digital is actually way ahead of AT&T."

Software modules

The vendors DEC teamed up with to offer Document Management have added CDA support to existing applications to provide software modules called Workflow Manager and Content Based Retrievers. DEC is using its own products to supply two other modules, Structured Document Libraries and Knowledge Linker.

Odesta Corp. is supplying the Workflow Manager software, which tracks the many steps involved in the document creation process. DEC will sell the Odesta Document Management System (ODMS), which consists of client software for Apple Computer, Inc. Macintosh and DEC VT-100 terminals, as well as server software that runs on DEC VAXes. Odesta said it will develop additional client software for DOS- or OS/2-based microcomputers, as well as for VMS- or Ultrix-based DEC workstations running DECwindows.

ODMS server software includes a document data base management system and enables managers to build on the server files that define a group of people that will work together to create a document. When one user completes a share of the work, the server automatically notifies the next person. ODMS server prices range from $25,000 to $150,000. ODMS client software costs between $500 and $1,500.

Three vendors will supply Content Based Retrievers, which enable users to search for and retrieve documents. Information Dimensions, Inc. will supply Basisplus software, which enables users to search a document index for key words or topics. It costs $5,000. Gescan International, Inc. will supply Gescan, which enables users to search entire documents for key words or topics. It costs from $22,000 to $60,000.

In addition, Excalibur Technologies, Inc. will supply its Savvy/Text Retrieval System, which uses an image to search for a document, and its PixTex software, which enables users to search for images based on key words or image descriptions. Savvy/Text Retrieval costs from $6,000 to $65,000 , and PixTex costs from $13,000 to $107,000.

DEC will supply its existing VAX-based Electronic Data Control System II software as a Structured Document Library that tracks where documents are stored on a network. Pricing starts at $24,000.

DEC will also supply the initial Knowledge Linker software, a product it calls LiveLink, which ensures that changes to a data file used to create a compound document are reflected in the actual document. It will be available this fall but has not yet been priced.

SW Bell signs up AT&T as user of net

continued from page 8

rates was somewhat risky.

The FCC has until July 9 to render a decision on Southwestern Bell's customer-specific filing, but the carrier is building the network despite the prospect of a regulatory delay.

AT&T made a five-year commitment to use STN after completing a competitive bidding process last year in which a number of carriers were asked to bid on an AT&T request for proposal for a self-healing network here.

A spokesman of one of the losers in the bidding process, Teleport Communications Group, said the bidding was not completely competitive because network connections were to be made at the Southwestern Bell central offices, where Teleport claims it is denied equal access.

David Cousins, AT&T division manager for business services access management, said only that the reason for the selection was because Southwestern Bell came in with the best package.

In its five-year contract with Southwestern Bell, AT&T agreed to pay a basic network charge of $174,200 per month plus $11,200 for two T-3 lines and $32,000 for multiplexers. Some nonrecurring charges apply. Two AT&T points of presence in Houston will be linked in a ring formation to 17 Southwestern Bell central offices.

AT&T will market STN primarily to business customers.

An AT&T spokesman said STN access will accommodate all Accunet private-line digital services, but switched services such as 800 WATS will be accommodated as the bandwidth allows.

Cousins said AT&T is seeking to establish similar arrangements with a number of the other local exchange companies, including Ameritech. He called the self-healing network solution "an emerging trend."

Aggregators face uncertain future

continued from page 4

communications consultancy that last week released a guide to the service aggregation market. "The aggregators are disrupting AT&T's entire sales process."

AT&T doesn't make as much money by selling to aggregators as it would if it dealt directly with users, he explained.

Step in the right direction

Thus, AT&T has taken steps to address the growth of aggregators. Late last year, AT&T lowered the revenue volume threshold needed to reap discounts on 800 services. The move was seen as an effort to help more users qualify for volume discounts on 800 services without going to an aggregator, Briere said.

In March, AT&T named Michael Keith director of distribution strategy and alternate channels. He will be responsible for developing a strategy for network service sales through direct and indirect channels, which include sales to aggregators. Keith is expected to hone AT&T's strategy for dealing with aggregators that cut in on AT&T's business, but most observers do not foresee any drastic moves.

"AT&T is not stupid enough to incur the wrath of customers that are basically theirs by shutting down the aggregators," said Bob Self, founder and owner of Market Dynamics, a New York-based consulting firm that plans to hold an aggregators conference in July. "AT&T will try to prune and control the industry."

While aggregators most commonly resell AT&T services, they also resell MCI and US Sprint services.

An MCI spokesman said a major drawback of aggregators is that they are causing confusion in the market. "Users don't know who to go to — the aggregator or the carrier — when they have a question about service," he said.

A US Sprint spokesman said his company "is not real positive toward aggregators." Although the carrier has tariffs designed for doing business with aggregators, US Sprint would prefer to work directly with customers or sell to them through value-added resellers, he said.

"Aggregators are basically cream skimming," he added.

Aggregators acknowledge that carriers are making it tougher for them to do business, a fact that will speed consolidation in the market as smaller companies look to be acquired or try to form partnerships with others.

"Our future depends on what AT&T does," said Charles Johnson, president of Phone America Corp., a Conyers, Ga.-based service aggregator.

Aggregators also admit that they have hurt themselves. For example, as in the young alternative operator services market, some aggregators' reputation with users has been damaged by unsavory business practices, including pyramid schemes and claims of nonexistent relationships with the carriers.

Yet many aggregators expressed optimism about their chances of survival, especially if they focus on providing users with more than just service discounts, such as rebilling and consulting services.

"Our philosophy is that there is life beyond aggregation," said International Telecom Group's Collett.

Using ISDN to bridge LANs

continued from page 2

used, Peters said.

"Our users are extremely happy [with the faster response time] and never want us to rip that sucker out," he said.

At 3M, the company is considering BRI to cost-effectively establish backup links from individual Ethernets to an Ethernet backbone at the company's St. Paul, Minn., headquarters, according to Mark Anderson, lead analyst in the company's telecommunications department.

"If you lost your Ethernet link, you could have an automatic dial backup at 64K instead of using dedicated lines," which 3M currently does, Anderson said.

According to Jeffrey Fritz, data communications analyst in the telecommunications department at West Virginia University (WVU) in Morgantown, BRI is a viable option provided the LANs it connects are not heavily loaded or supporting high-bandwidth applications such as imaging.

WVU has tested BRI links to replace T-1 connections between Ethernets on campus. "Unless [the BRI line] was heavily loaded, interactive users could tell no difference" in response time compared with T-1, Fritz said.

Major limitation

"The main drawback is that compared to T-1, the bandwidth is extremely limited, which means users have to apply it very carefully to bridging," Fritz said.

Motorola, Inc. is testing BRI service for communications with two other vendors, Ameritech Services, Inc. and Northern Telecom, Inc. The companies are working together to develop ISDN applications ("Ameritech, Motorola, NTI join to develop new ISDN applications," *NW,* Oct. 24, 1988).

Networked and stand-alone Apple Computer, Inc. Macintoshes in eight locations, including Ottawa, Raleigh, N.C., and Schaumburg, Ill., are linked via BRI.

In Motorola's trial, BRI supports a multipoint screen-sharing application referred to as telepresentations, which enables Macintosh users to simultaneously view a file, such as technical specifications for the trial. The file viewing is supported by one BRI channel while voice conversations among participants are supported on the other.

> "Our users are happy [with response time] and never want us to rip that sucker out."
>
> ▲▲▲

"We see this as having potential when a group is working on a complex project and needs on-demand connectivity, rather than constant communications," said Maxine Baratz, manager of ISDN trials for Motorola Corporate Research and Development, Digital Networks.

Although the use of BRI for LAN connections has won over some users, they agreed that BRI has its limitations.

One drawback, according to Ameritrust's Peters, is a general lack of ISDN management tools, at least partly because the technology has not fully matured.

But Eugene Chang, senior product manager for LAN products at Microcom in Norwood, Mass., pointed out that Microcom's recently introduced ISDN bridge can be monitored by a personal computer running Simple Network Management Protocol-compliant software.

Wait-and-see stance

At least two internetworking vendors have adopted a wait-and-see approach to ISDN, saying the lack of widespread availability and pricing information keeps users' plans, and, therefore, vendor response, on hold.

Wellfleet Communications, Inc. is likely to initially support ISDN's frame relay, which supports T-1 speeds and does not require users to dedicate bandwidth to specific applications, according to Karen Barton, director of product marketing at Wellfleet.

The company does not have definite plans to support BRI or Primary Rate Interface (PRI), which divides a T-1 line into 23 64K bit/sec voice or data channels and a single 64K bit/sec signaling channel.

Cisco Systems, Inc. has announced support for frame relay and could support BRI or PRI in the future, according to Douglas Tsui, product marketing manager at the company.

Teleport seeking partners for major U.S. expansion

By Bob Brown
Senior Editor

NEW YORK — Merrill Lynch & Co., Inc. last week said it is looking for equity partners for its Teleport Communications Group to raise cash for an expansion of its bypass network subsidiary.

Teleport would use the cash to build new bypass facilities in major cities coast to coast. This would let users better coordinate alternative access to Bell operating companies nationwide.

Teleport currently operates metropolitan networks in Boston, New York and San Francisco, and it is building nets in Chicago, Houston and Los Angeles.

"We see a tremendous opportunity to expand, and that will require tremendous resources," said Bob Atkinson, Teleport's senior vice-president for regulatory and external affairs. Teleport has no exact time frame for blanketing the country with local bypass nets, he said.

Merrill Lynch, which owns 97.4% of Teleport, plans to sell as much as 49% of its stake in the company, according to sources.

Possible investors include U.S. and European carriers or a group of Japanese network equipment makers, said Berge Ayvazian, a vice-president at The Yankee Group, a Boston consultancy. British Telecommunications PLC and Contel Corp. are among the companies believed to be interested in Teleport, observers said.

"This could be important for [users] in that it could accelerate the growth of the alternative access industry," Ayvazian said.

A cash infusion could pressure other alternative access carriers to seek capital or merger partners, said Mark Lowenstein, a telecommunications analyst at The Yankee Group.

According to a Merrill Lynch spokesman, the decision to look for new Teleport partners has nothing to do with the ongoing restructuring at the firm, which lost $213.4 million last year.

Merrill Lynch has invested about $100 million in Teleport, which reported about $25 million in sales last year, analysts said.

Court bars Bell from caller ID

continued from page 2

way that customers can protect themselves from caller harassment, while opponents have labeled ANI an invasion of privacy.

Since December, Bell of Pennsylvania has been subject to a temporary ban on its caller ID service until the Commonwealth Court of Pennsylvania could rule on the legality of the offering. The carrier's service allows a customer to view the originating telephone number of an incoming call.

The Commonwealth Court took up the issue after a coalition of consumer and civil rights groups, plus the state's Office of Consumer Advocate, appealed to the court, charging that the service violated state law.

The Pennsylvania Public Utility Commission had reviewed the issue earlier and, against the advice of an administrative law judge, ruled that the Bell company could begin offering the service with no option for callers to block numbers from being transmitted.

The coalition argued that, at a minimum, callers should be allowed to block their numbers because the state's wiretap law requires users to give their consent before any communications, including their phone number, is intercepted.

Last week's decision by a five-judge panel went well beyond what the coalition was seeking, ruling that caller ID is illegal under Pennsylvania state law, even if blocking were provided.

The state's wiretap law forbids the capture of information that identifies the originating number of a communications transmission unless all parties consent. Even if blocking were offered, only one of the parties involved in a call could consent to or deny the capture of the originating number, the judges ruled.

In addition, the court pointed out that a caller ID device could be placed on a telephone line to intercept phone numbers without the knowledge of either the caller or recipient.

The Commonwealth Court also ruled that caller ID violates privacy statutes in the state constitution. The court said that blocking is not an adequate protection of customers' privacy.

A Bell of Pennsylvania spokesman said the ruling appears to apply only to caller ID and will not affect 800 or 900 services that deliver callers' numbers to corporations. He also said Bell of Pennsylvania may pursue an appeal of the ruling.

Dan Clearfield, assistant consumer advocate in Pennsylvania and one of the parties in the lawsuit, said the ruling is significant because it establishes the right of individuals to control personal information.

Noam said that, at the least, the ruling is likely to prompt similar lawsuits in other states where caller ID is being offered.

Since the court focused on privacy, he said, other states will probably push carriers to offer blocking as a minimum protection.

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THE INDUSTRY STANDARD

Unisys set to unveil X.500 plans

continued from page 1

dress of the resource.

DS will consist of two main software components, both of which will initially be available for Unisys U series multiuser Unix systems, said Philip Wimpenny, program development manager in Unisys' Computer Systems Group. Directory System Agent (DSA) software supports directory data bases, while Directory User Agent (DUA) software lets users and applications access the directories.

The two can run on the same or different machines, depending on configuration (see "Unisys explains X.500," this page). Multiple DSAs, for example, can run on different computers to create a distributed directory (see graphic, page 1).

Initially, DS will be tied to Unisys' two existing OSI applications, the X.400 Message Handling System and File Transfer, Access and Management (FTAM), Wimpenny said. Coupled with those applications, DS will let users send E-mail and access or store files without having to know the full net address of individual users, files, applications or storage devices.

In addition, Unisys will provide an application program interface (API) through which users can tie DS to any of their existing non-OSI applications, including proprietary E-mail or network management systems, Wimpenny said. The API will let those proprietary systems participate in an OSI network.

Analysts said the X.500 announcement together with Unisys' OSI products will give the company a lead in OSI over other major systems vendors.

Digital Equipment Corp., for example, has pledged to offer X.500 but not for about six months after it ships DECnet Phase V, which is due out this summer ("DEC describes benefits of X.500 directory services," *NW,* April 30).

IBM, as part of its OSI/Communications Subsystem, is shipping a subset of X.500 that supports only centralized directories because it does not support communications among DSAs. And AT&T last week said it will incorporate Retix's OSI software, including X.500, into Unix System V but said X.500 will not ship until the first quarter of 1991.

In July, Unisys will ship DS for its U series Unix-based processors, each of which supports from 16 to more than 256 users.

Subsequent releases for the company's 1100/2200 series mainframes, A series mainframes and BTOS/CTOS workstations acquired from Convergent Technologies, Inc. will follow.

The key to success

Analysts said the key to the success of any vendor's X.500 product will be the value-added features each provides.

"X.500 by itself is not going to be of tremendous use, but [used] in conjunction with X.400 for document distribution or with a network management scheme, it would enable better interoperability through the network," said Dale Kutnick, president and research director at the META Group in Westport, Conn.

One way Unisys plans to distinguish its X.500 offering is by integrating it with X.400 and FTAM. Another will be the way DS deals with requests for addresses when the request does not include all the information.

According to the X.500 standard, users must enter a minimum amount of information — such as country, organization and name — to the directory in order to find the full address of an object, said Roy Rosner, president and chief executive officer of GSI Danet, Inc. of Reston, Va., a maker of OSI conformance test software used by Unisys. It is up to each implementor to decide how to deal with requests that do not include all the information.

Unisys will implement algorithms that provide default values based on past directory usage trends when required information is missing. Or DS can request information from the X.400 or FTAM application, which will request it from the user.

Unisys will also offer an API that can be used to tie DS to existing non-OSI applications. That will come into play as Unisys works on using DS to create a repository for information, such as network configuration and fault logon, that net management systems can refer to when trying to isolate network problems or track trends. Such a directory, coupled with other OSI net management protocols, would provide a standardized way for different vendors' net management systems to share data.

Unisys DS for U series machines costs between $2,000 and $9,000 for the DSA software, and between $750 and $3,000 for the DUA software.

Unisys explains X.500

BLUE BELL, Pa. — Unisys Corp. last week laid out its interpretation of the OSI X.500 Directory System Protocol and explained the way in which directories are built according to the standard.

Five basic elements are included in the X.500 protocol definition: Directory System Agents (DSA), Directory User Agents (DUA), Directory Information Base (DIB), Directory Information Tree (DIT) and Directory Schema.

The DSA is the heart of an X.500 directory because it acts as the repository for directory entries and typically uses a relational data base program to manage those entries. One or more DSAs are allowed in any implementation, and both centralized and distributed directories are supported.

Unisys will support both directories, said Philip Wimpenny, program development manager in Unisys' Computer Systems Group. Large nets will likely require a distributed directory, while smaller nets can use a centralized version.

DSAs communicate using the Directory System Protocol, a peer-to-peer protocol defined in the X.500 standard. Conformance to that protocol allows DSAs running on different vendors' systems to communicate.

The DUA is the user interface to the DSA component of the directory. In most implementations, including Unisys', the DUA is queried automatically by an application such as X.400 and not by a user. The DUA communicates with the directory data base using the X.500 Directory Access Protocol, which is a protocol that supports the request and delivery of information on behalf of the user.

Unisys will offer separate DUA and DSA software packages, Wimpenny said. That means users could configure a single Unix system with DSA software and let it act as a centralized directory for multiple systems. Those other systems would require only the less expensive DUA software.

As other vendors come out with X.500 support, any of their DUAs could access the Unisys directory.

To build a distributed directory out of multiple local directories, each participating system has to be configured with both the directory data base and DUA software.

The third X.500 component, the DIB, is simply the name for the single logical directory formed by all the DSAs that can communicate with one another.

The DIT defines the logical hierarchical structure implementors must follow when building a directory.

The Directory Schema defines the attributes of each directory entry. For example, an organization's attributes may include its name and address. The schema lets users build entries that meet their own needs.

— Paul Desmond

Diverse net routing not diverse?

continued from page 1

ber co-owned by Williams Telecommunications Group, Inc. (WTG) and US Sprint Communications Co., knocking out 226 T-3 circuits.

Six other carriers, including Cable & Wireless Communications, Inc., Communications Transmission, Inc., MCI Communications Corp. and RCI Long Distance Corp., also leased capacity on the fiber, which was out of service for more than five hours.

"Carriers tell customers they have all kinds of route diversity up until the first outage," said Dale Davin, assistant vice-president of network engineering for Mellon Bank Corp.'s telecommunications division in Pittsburgh. "As a result, we trust no carrier in this circus."

In one instance, the bank lost a Litel Telecommunications Corp. T-1 between South Bend, Ind., and Pittsburgh, and an MCI circuit between Chicago and Pittsburgh that was on the same cable, Davin said.

"We have route diversity for most of our major network arteries by going with the major carriers, which are less likely to be swapping capacity with other carriers," Davin said.

But even the major carriers use facilities leased from other carriers. Charlie Cole, vice-president of network planning and development for WTG, said roughly 70% of the traffic on its nationwide network is generated by about 100 carriers, including MCI, Telecom*USA, Inc., other national carriers, regional carriers, resellers and aggregators.

"You won't find all of the [100 carriers] on every part of the network, but you will find a substantial number of them on the most popular routes," Cole said.

Some users have been caught off guard by presuming the geographic topology of their networks would preclude a cable cut from affecting them.

MidLantic National Bank in West Orange, N.J., learned that the hard way. The bank happened to be looking into diverse routing options for its AT&T T-1 network when, on Nov. 18, 1988, a cable cut brought down the carrier's main Eastern Seaboard fiber. MidLantic lost nine T-1s for several hours.

"We had T-1s that went west to Pennsylvania," said Frank Ferrara, a vice-president and manager of communications services for MidLantic. "We never expected to lose them, but we did because they were routed down the [fiber] corridor to Philadelphia and then up to our sites. You never really know if you have route diversity until a cable is cut."

MidLantic has replaced some AT&T T-1s with MCI service in certain regions. "We couldn't get the kind of diversity we wanted from a single carrier," Ferrara said. "We're fairly sure now that with our AT&T/MCI plan, we're pretty much protected from any major failure."

Customer pleas for diverse routing are not falling on deaf ears, according to Richard Mack, a research analyst with Kessler Marketing Intelligence Corp. (KMI), a Newport, R.I.-based consultancy that tracks carrier's fiber deployment.

"This year, for the first time, the amount of route miles of fiber going in for redundant routes will exceed the amount of route miles installed as new network routes," Mack said. "The driving force for interexchange carriers' laying of fiber is route diversity."

Some carriers, including AT&T, US Sprint and WTG, try to offer route diversity over existing facilities but will also install or acquire additional capacity where that is not possible. AT&T, MCI and US Sprint review user requests for diverse routing on a case-by-case basis.

US Sprint, which was hit hard by two recent fiber cuts in a 24-hour period, said it is in the midst of a networkwide diverse routing program for switched traffic that was kicked off a year ago.

Gil Mauk, vice-president of operations for US Sprint, said the carrier is splitting 50% of its intermachine trunks into geographically separate paths to provide an alternate route between any two points of presence. "It's a massive project. We're physically disconnecting half the circuits on every route and installing them elsewhere," Mauk said.

The program is slated to be completed in the third quarter.

Justice charges Nynex

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proprietary information and should not be disclosed. The letter was made public by Scott Rafferty, a former employee of Telco Research, who used the letter in a lawsuit against Nynex for wrongful dismissal.

Rafferty said he was fired after he raised questions about the legality of some of Telco Research's activities. His case is still pending before Greene.

The criminal indictment adds to mounting legal problems faced by the RBHC. In May, Rafferty and two companies filed suits against Nynex in federal district court in New York alleging that the company violated federal antiracketeering laws in its procurement practices with subsidiary Nynex Material Enterprises Co.

In February, the Federal Communications Commission levied the largest fine in the FCC's history against Nynex for overcharging users $120 million from 1984 to 1988 by buying equipment and services through Nynex Material Enterprises at inflated rates.

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